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COMPUTER BASED

I/O CATALOG

Edition 6

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SIXTH EDITION

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I/O CATALOG

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INTRODUCTION

Opto 22 was founded in 1974, and is committed to producing the most reliable optically isolated solid state relays possible. That commitment to quality and customer service soon established Opto 22 as the leading supplier of solid state relays in the United States and Europe.

In 1978 the first plug compatible I/O system for microprocessors was introduced. The red, white, black, and yellow I/O modules that were part of the 1978 introduction are now familiar in control applications throughout the world.

A continuing R & D effort since 1978 has resulted in a complete family of I/O system components for an endless variety of data acquisition and control applications.

With OPTOMUX analog and digital Brain Boards and I/O mounting racks all you need is an IBM PC or other host computer and a simple 4-wire communication link for the simplest or most sophisticated distributed control or data acquisition system.

With PAMUX analog and digital Brains Boards and I/O mounting racks connected to the parallel port of a computer, you get extremely high-speed data acquisition and control at distances up to 500 feet.

Our application engineers are always ready to answer your questions. Call us at 714-891-5861 or 800-854-8851 (outside of California). Fax: 714-893-0867 or Telex: 692-386. The Opto 22 BBS is 714-892-8375.

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TABLE OF CONTENTS

DESCRIPTION	SECTION
OPTOMUX/PAMUX Brain Boards	1
Adapter Cards	2
Local Controllers	3
Digital I/O Mounting Racks	4
Analog I/O Mounting Racks	5
Digital I/O Modules	6
Analog I/O Modules	7
Accessories	8

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SECTION 1

OPTOMUX/PAMUX Brain Boards

DESCRIPTION	MODEL	PAGE
4/8/16 Channel Digital OPTOMUX Brain Board	B1	1 - 1
4/8/16 Channel Analog OPTOMUX Brain Board	B2	1 - 3
32 Channel Digital PAMUX Brain Board	B4	1 - 5
4/8/16 Channel Digital PAMUX Brain Board	B5	1 - 7
4/8/16 Channel Analog PAMUX Brain Board	B6	1 - 9
PAMUX Bus Terminator Card	TERM1	1 - 11

OPTOMUX BRAIN BOARD 4/8/16 CHANNEL DIGITAL

DESCRIPTION

The Digital OPTOMUX Brain Board is an intelligent digital controller which operates as a slave device to a host computer. Each Digital OPTOMUX Brain Board contains a microprocessor that provides the necessary intelligence to carry out serial communications with a host computer and also perform control functions at each channel of I/O. The Digital OPTOMUX Brain Boards are designed to mount on the Opto 22 I/O mounting racks which have header connectors. I/O mounting racks are available which accept single channel I/O modules, Quad Pak I/O modules, or have built-in integrated I/O circuitry.

When combined with an I/O mounting rack, the Digital OPTOMUX Brain Board can perform the following functions:

Latching
Counting
Pulse Measurement
Time Delays
Pulsed Outputs

Communication with a host computer is over an RS422/485 serial link composed of a dual twisted pair line which connects to each OPTOMUX station. The serial link operates at selectable baud rates from 300 to 38.4k baud. OPTOMUX stations can be configured for either multidrop or repeat mode operation. In multidrop mode, up to 100 OPTOMUX stations can be networked over a total line length of up to 5,000 feet. In repeat mode operation, up to 256 OPTOMUX stations can be networked with up to 5,000 feet between stations.

FEATURES

- LED indicators for power and communications
- Transient protection on communications lines
- Onboard diagnostics and error checking
- Simple ASCII message structure for increased throughput and easy implementation
- Message checksum to insure secure communications
- OPTOMUX returns diagnostic codes

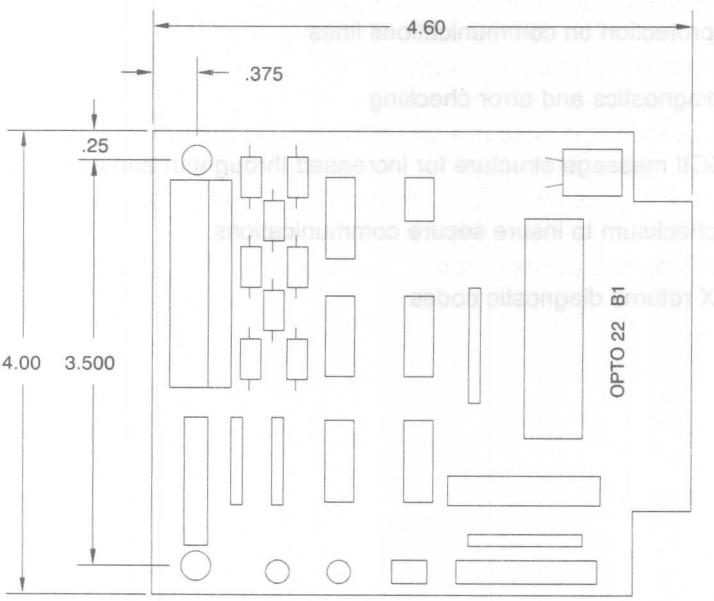
OPTOMUX BRAIN BOARD 4/8/16 CHANNEL DIGITAL

B1

SPECIFICATIONS

Power Requirements:	5 VDC ± 0.1 V @ 0.5 amperes (includes module requirements)	
Operating Temperature:	0 to 70° C 95% humidity, non-condensing	
Interface:	RS-422/485 communications 50-pin female header connector to I/O mounting rack	
Data Rates:	300, 600, 1200, 2400, 4800, 9600, 19200, and 38400 baud	
Range:	Multidrop	- up to 5,000 feet total length - 100 OPTOMUX stations maximum
	Repeat	- up to 5,000 feet between stations - 256 OPTOMUX stations maximum
Communications:	Full duplex, two twisted pairs and a ground	
Indicators:	Power, receive, and transmit	
Options:	Jumper selectable	- Address (0 to 255) - Baud rates - Multidrop or repeat mode - 2- or 4-pass protocol

DIMENSIONS



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OPTOMUX BRAIN BOARD 4/8/16 CHANNEL ANALOG

DESCRIPTION

The Analog OPTOMUX Brain Board is an intelligent analog controller which operates as a slave device to a host computer. Each Analog OPTOMUX Brain Board contains a microprocessor that provides the necessary intelligence to carry out serial communications with a host computer and also perform control functions at each channel of I/O. The Analog OPTOMUX Brain Boards are designed to mount on the Opto 22 I/O mounting racks which have header connectors.

When combined with an I/O mounting rack, the Analog OPTOMUX Brain Board can perform the following functions:

Input Averaging
High/Low Limit Monitoring
Peak And Valley Recording
Gain And Offset Calculations
Output Waveform Generation

Communication with a host computer is over an RS-422/485 serial link composed of a dual twisted pair line which connects to each OPTOMUX station. The serial link operates at selectable baud rates from 300 to 38.4k baud. OPTOMUX stations can be configured for either multidrop or repeat mode operation. In multidrop mode, up to 100 OPTOMUX stations can be networked over a total line length of up to 5,000 feet. In repeat mode operation, up to 256 OPTOMUX stations can be networked with up to 5,000 feet between stations.

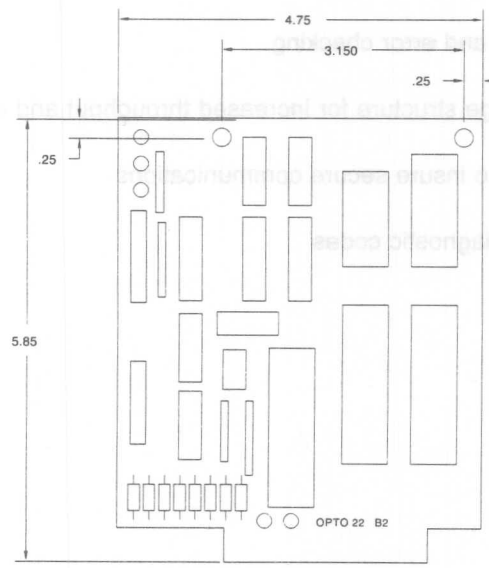
FEATURES

- LED indicators for power and communication
- Transient protection on communications lines
- Onboard diagnostics and error checking
- Simple ASCII message structure for increased throughput and easy implementation
- Message checksum to insure secure communications
- OPTOMUX returns diagnostic codes

SPECIFICATIONS

Power Requirements:	5 VDC ± 0.1 V @ 0.5 amperes 15 VDC ± 0.25 V @ 10 mA (excludes module requirements)	
Operating Temperature:	0 to 70° C 95% humidity, non-condensing	
Interface:	RS-422/485 communications 50-pin female connector to I/O mounting rack	
Data Rates:	300, 600, 1200, 2400, 4800, 9600, 19200, and 38400 baud	
Range:	Multidrop	- up to 5,000 feet total length - 100 OPTOMUX stations maximum
	Repeat	- up to 5,000 feet between stations - 256 OPTOMUX stations maximum
Communications:	Full duplex, two twisted pairs and a ground	
Indicators:	Power, transmit, and receive	
Options:	Jumper selectable	- Address (0 to 255) - Baud rates - Multidrop or repeat mode - 2- or 4-pass protocol

DIMENSIONS



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PAMUX BRAIN BOARD 32 CHANNEL DIGITAL

B4

DESCRIPTION

The Digital PAMUX B4 Brain Board is a high-speed, high-density, addressable digital controller for controlling up to 32 channels of inputs or outputs in distributed I/O applications. The PAMUX B4 Brain Board is designed to plug into the PB32HQ I/O mounting rack which holds eight Quad Pak modules for a total of 32 I/O points.

Connection to a host computer is via a 50-conductor, flat ribbon cable which can extend to a distance of up to 500 feet from the host. Up to sixteen PAMUX B4 Brain Boards can be daisy-chained from one ribbon cable for a total of 512 I/O points.

The PAMUX bus is a high-speed bus which allows a host computer to address both analog and digital PAMUX Brain Boards. A system with all digital PAMUX Brain Boards would require less than 500 microseconds to read or write all 512 digital I/O channels. The PAMUX family of products is ideal for the following applications:

Robotics
Numerical Control
Conveyor Line Control
Sequence Of Events Fault Detection

FEATURES

- High density
- High speed digital control
- LED indicators for power and bus activity
- Watchdog timer with selectable configurations
- Distributed I/O up to 500 feet

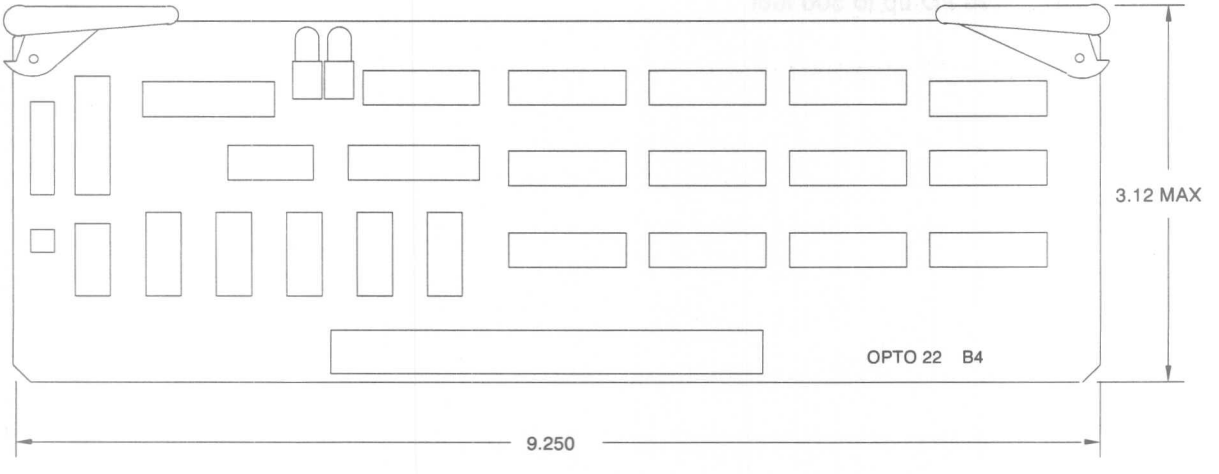
PAMUX BRAIN BOARD
32 CHANNEL DIGITAL

B4

SPECIFICATIONS

Power Requirements:	5 VDC ± 0.1 V @ 0.5 amperes 5 VDC ± 0.1 V @ 1.5 amperes if TERM1 installed (terminator card is installed on last station only)
Operating Temperature:	0 to 70° C 95% humidity, non-condensing
Interface:	70-pin box connector to PB32HQ I/O mounting rack 50-pin male connector located on PB32HQ I/O mounting rack for bus connection
Data Rates:	2.2 microsecond bus cycle for 8 positions (read or write) at 500 feet
Range:	Up to 500 feet total length Up to 16 B4 Brain Boards on one PAMUX bus
Indicators:	Watchdog and address
Options:	Jumper selectable - Address - Watchdog function - Reset level

DIMENSIONS



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PAMUX BRAIN BOARD 4/8/16 CHANNEL DIGITAL

B5

DESCRIPTION

The Digital PAMUX B5 Brain Board is a high-speed, addressable, digital controller for controlling up to 16 channels of inputs or outputs in distributed I/O applications. The PAMUX B5 Brain Board is designed to mount on the Opto 22 I/O mounting racks which have header connectors. I/O mounting racks are available which accept single channel I/O modules, Quad Pak I/O modules, or have built-in integrated I/O circuitry. Connection to a host computer is via a 50-conductor, flat ribbon cable which can extend to a distance of 500 feet from the host. Up to 32 PAMUX B5 Brain Boards can be daisy-chained from one ribbon cable for a total of 512 I/O points.

The PAMUX bus is a high-speed bus which allows a host computer to address both analog and digital PAMUX Brain Boards. A system with all digital PAMUX Brain Boards would require less than 500 microseconds to read or write all 512 digital I/O channels. The PAMUX family of products is ideal for the following applications:

Robotics
Numerical Control
Conveyor Line Control
Sequence Of Events Fault Detection

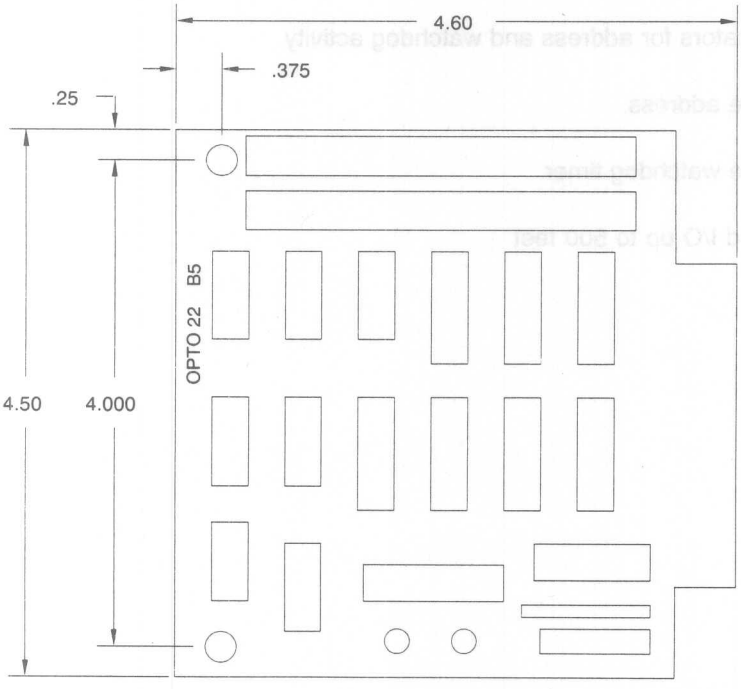
FEATURES

- Connection to a variety of I/O mounting racks
- High speed digital control
- LED indicators for address and watchdog activity
- Selectable address
- Selectable watchdog timer
- Distributed I/O up to 500 feet

SPECIFICATIONS

Power Requirements:	5 VDC ± 0.1 V @ 0.5 amperes 5 VDC ± 0.1 V @ 1.5 amperes if TERM1 installed (terminator card is installed on last station only)
Operating Temperature:	0 to 70° C 95% humidity, non-condensing
Interface:	50-pin female connector to I/O mounting rack 50-pin male connector to PAMUX bus
Data Rates:	2.2 microsecond bus cycle for 8 positions (read or write) at 500 feet
Range:	Up to 500 feet total length Up to 32 B5 Brain Boards on one PAMUX bus
Indicators:	Watchdog and address
Options:	Jumper selectable - Address - Watchdog function - Reset level

DIMENSIONS



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PAMUX BRAIN BOARD 4/8/16 CHANNEL ANALOG

B6

DESCRIPTION

The Analog PAMUX B6 Brain Board is an addressable analog controller for controlling up to 16 channels of analog input and/or output in distributed I/O applications. The PAMUX B6 Brain Board is designed to mount on the Opto 22 analog I/O mounting racks which have header connectors. These analog I/O mounting racks accepts a wide range of optically isolated analog input and output modules.

Connection to a host computer is via a 50-conductor flat ribbon cable which can extend to a distance of up to 500 feet from the host. Up to 32 PAMUX B6 Brain Boards can be daisy-chained from one ribbon cable for a total of 512 analog I/O points.

The on-board microprocessor reads, converts, and updates the PAMUX B6 Brain Board's internal memory at a rate of 3 to 6 milliseconds for all 16 outputs. The time required to update 16 output channels from the data in the internal memory is typically 15 milliseconds. These times do not reflect the speed of the particular analog I/O module used.

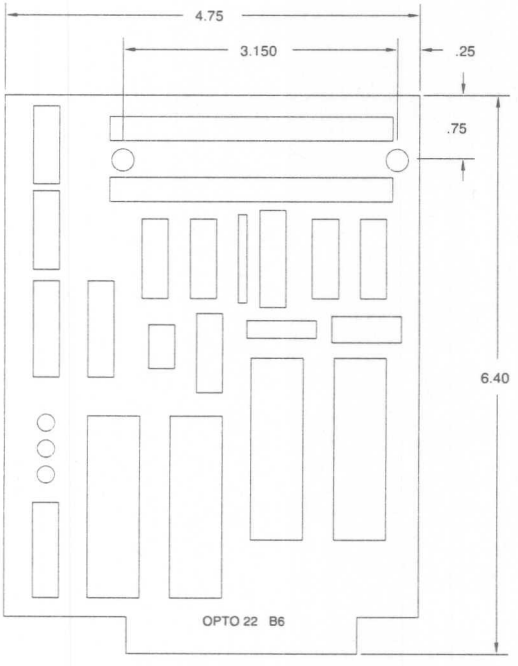
FEATURES

- Connection to a variety of mounting racks
- High speed control
- LED indicators for access, address, and power on
- Distributed I/O up to 500 feet

SPECIFICATIONS

Power Requirements:	5 VDC ± 0.1 V @ 1 ampere 5 VDC ± 0.1 V @ 2 amperes if TERM1 installed (terminator card is installed on last station only) ± 15 VDC ± 0.25 V @ 10 mA (excludes module requirements)
Operating Temperature:	0 to 70° C 95% humidity, non-condensing
Interface:	50-pin female connector to I/O mounting rack 50-pin male connector to PAMUX bus
Data Rates:	8.8 microsecond bus cycle per analog channel (read or write) at 500 feet
Range:	Up to 500 feet total length Up to 32 B6 Brain Boards on one PAMUX bus
Indicators:	Access, address, and power on
Options:	Jumper selectable - Address - Reset level - Watchdog

DIMENSIONS



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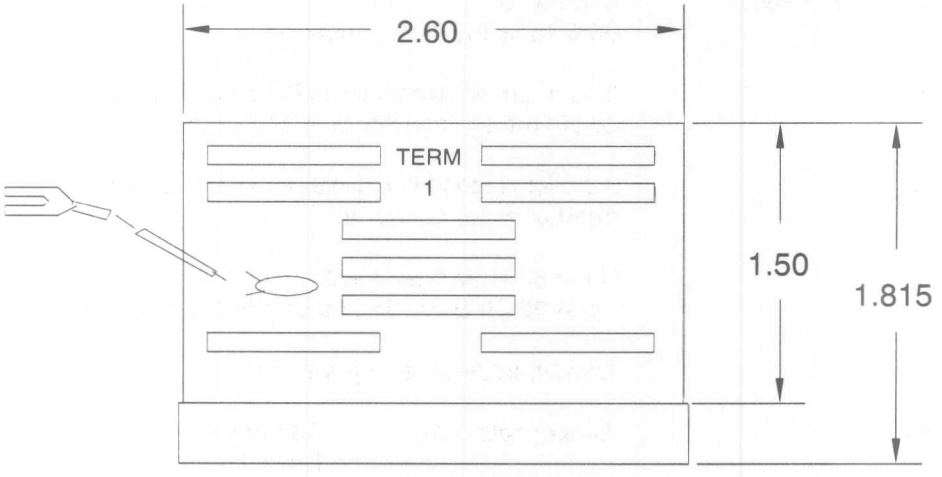
PAMUX BUS TERMINATOR CARD TERM1

DESCRIPTION

The PAMUX bus terminator card passively terminates the PAMUX bus. One TERM1 card is required for the last PAMUX board on the link.

DIMENSIONS



Notes:

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SECTION 2

ADAPTER CARDS

DESCRIPTION	MODEL	PAGE
IBM PC Bus To I/O Mounting Rack Adapter	AC5	2 - 1
DEC Q-Bus To PAMUX Bus Adapter	AC6	2 - 2
RS-232 To RS-422/485 Converter	AC7A/B	2 - 3
OPTOMUX Half-Duplex Modem Adapter	AC8/A/B	2 - 5
IBM PC Bus RS-422/485 Adapter With Isolation	AC24/AT	2 - 7
IBM PC Bus To PAMUX Bus Adapter	AC28	2 - 9
RS-422/485 Multidrop Repeater	AC30A/B	2 - 10
OPTOMUX Network Interface Adapter	AC31A/B/C	2 - 12
Dual RS-422/485 Adapter For Micro Channel Computers	AC32	2 - 14
PAMUX Bus Adapter For Micro Channel Computers	AC33	2 - 15
Isolated RS-422/485 Adapter For Micro Channel Computers	AC34	2 - 16
TTL To PAMUX Converter	AC36	2 - 17
IBM PC Bus RS-422/485 Adapter	AC422/AT	2 - 18
IEEE 488 To PAMUX Bus Adapter	IEEE488	2 - 19
Universal Interface To PAMUX Bus Adapter	UCA2	2 - 20
Universal Adapter Card	UCA3	2 - 21
RS-422/485 Adapter Card Selection Guide		2 - 22

IBM PC BUS TO I/O MOUNTING RACK ADAPTER AC5

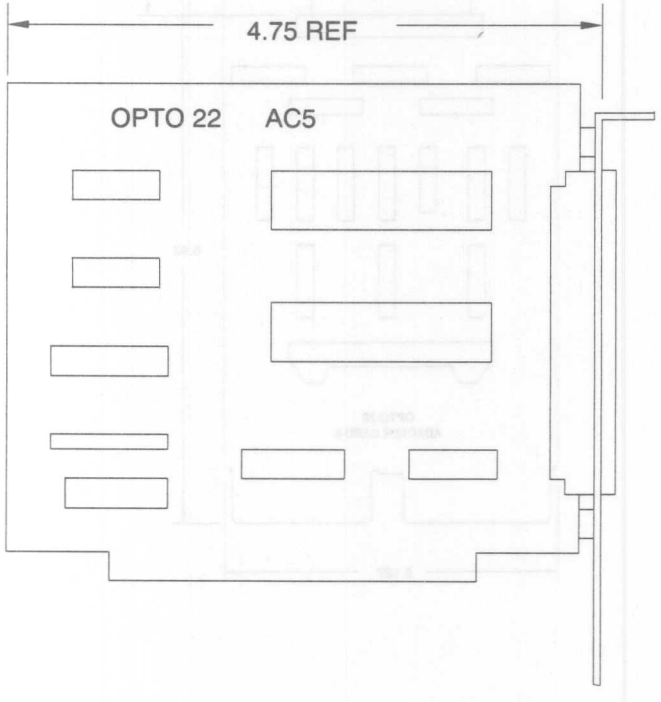
DESCRIPTION

The AC5 adapter card is designed to provide an interface between the IBM PC bus and a variety of I/O mounting racks. One AC5 is required per I/O mounting rack. The AC5 provides up to 24 bi-directional TTL level I/O lines. A maximum of four AC5 adapter cards can be installed into one computer. A six foot cable (C6) is furnished with the AC5 for connecting to I/O mounting racks having edge connectors (PB8, PB16A/C, PB24, or PB24Q). I/O mounting racks with header connectors (PB4H, PB8H/HE, or PB16H/HC/HE/HQ/J/K/L) require a header connector which is included with the AC5 adapter card.

SPECIFICATIONS

Power Requirements:	5 VDC @ 0.3 amperes
Operating Temperature Range:	0 to 60° C 95% relative humidity, non-condensing
Interface:	50-pin male header connector
Distance:	Up to 10 feet
Input Load Current (sinking):	12 mA

DIMENSIONS



DEC Q-BUS TO PAMUX BUS ADAPTER AC6

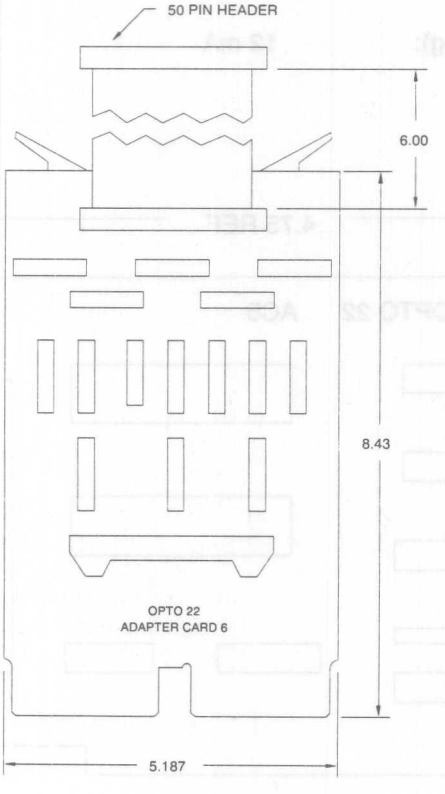
DESCRIPTION

The AC6 adapter card is a DEC Q-BUS interface card to the PAMUX bus. Each AC6 requires one-half slot and one port of a DEC DRV11-J parallel line card. Each AC6 adapter card can drive up to 512 digital I/O points, 512 analog I/O points, or a combination thereof over a total distance of 500 feet.

SPECIFICATIONS

Power Requirements:	5 VDC @ 1.5 amperes
Operating Temperature Range:	0 to 70° C 95% relative humidity, non-condensing
Interface:	50-pin male header connector
Distance:	Up to 500 feet

DIMENSIONS



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RS-232 TO RS-422/485 CONVERTER

AC7A
AC7B

DESCRIPTION

The AC7A/B adapter card converts an RS-232 serial port to an RS-422/485 serial port. The AC7A/B is optically isolated with full transient protection on the RS-422/485 port. The converter operates as a full duplex device with transmission speeds up to 38,400 baud for distances up to 5,000 feet using two twisted pairs and a ground.

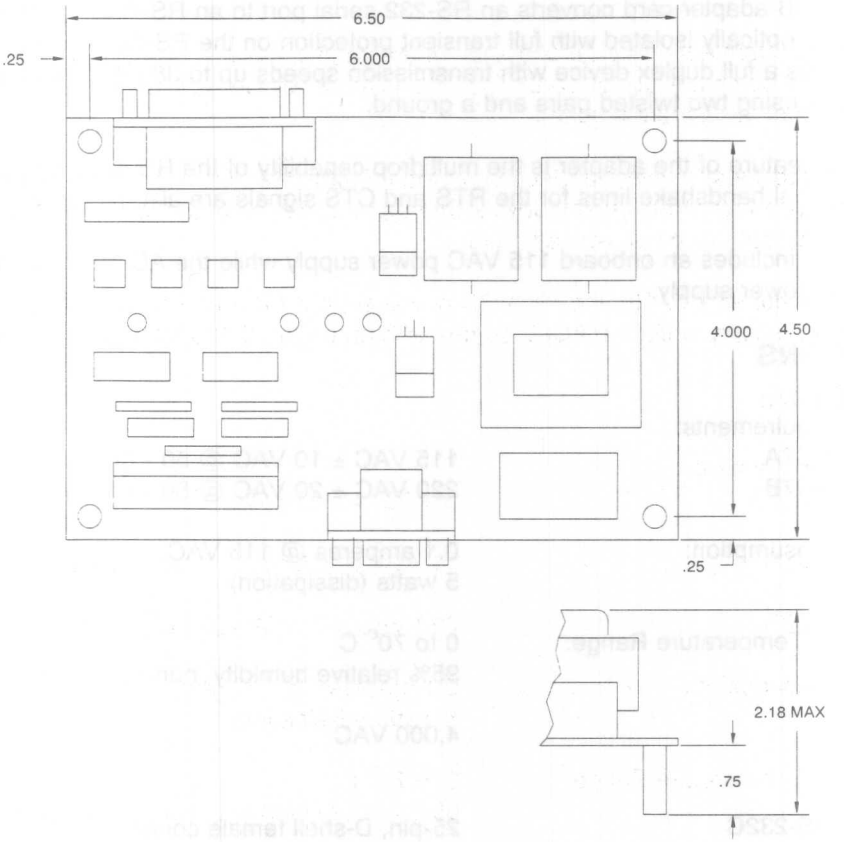
A special feature of the adapter is the multidrop capability of the RS-422/485 port. Bi-directional handshake lines for the RTS and CTS signals are also provided.

The AC7A includes an onboard 115 VAC power supply while the AC7B comes with an onboard 220 VAC power supply.

SPECIFICATIONS

Power Requirements:	
AC7A	115 VAC ± 10 VAC @ 50 - 60 Hz
AC7B	220 VAC ± 20 VAC @ 50 - 60 Hz
Power Consumption:	0.1 amperes @ 115 VAC 5 watts (dissipation)
Operating Temperature Range:	0 to 70° C 95% relative humidity, non-condensing
Isolation:	4,000 VAC
Interface:	
RS-232C	25-pin, D-shell female connector
RS-422/485	Screw terminals or 9-pin, D-shell female connector
Baud Rate:	Up to 38,400 baud
Distance:	
RS-232C	Up to 50 feet
RS-422/485	Up to 5,000 feet
Communications:	RS-422/485 full duplex over two twisted pairs and a ground Additional twisted pairs for RTS and CTS Multidrop control from RS-422/485 CTS or from RS-232 RTS RS-232 full duplex with selectable handshaking
Indicators:	Transmit, receive, RTS, CTS, and power

DIMENSIONS



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OPTOMUX HALF DUPLEX MODEM ADAPTER

AC8
AC8A
AC8B

DESCRIPTION

The AC8 modem adapter card converts an half duplex RS-232 modem to an full duplex RS-422/485 communications port. The AC8 is ideal for use with half duplex, non-intelligent modems such as a radio modem.

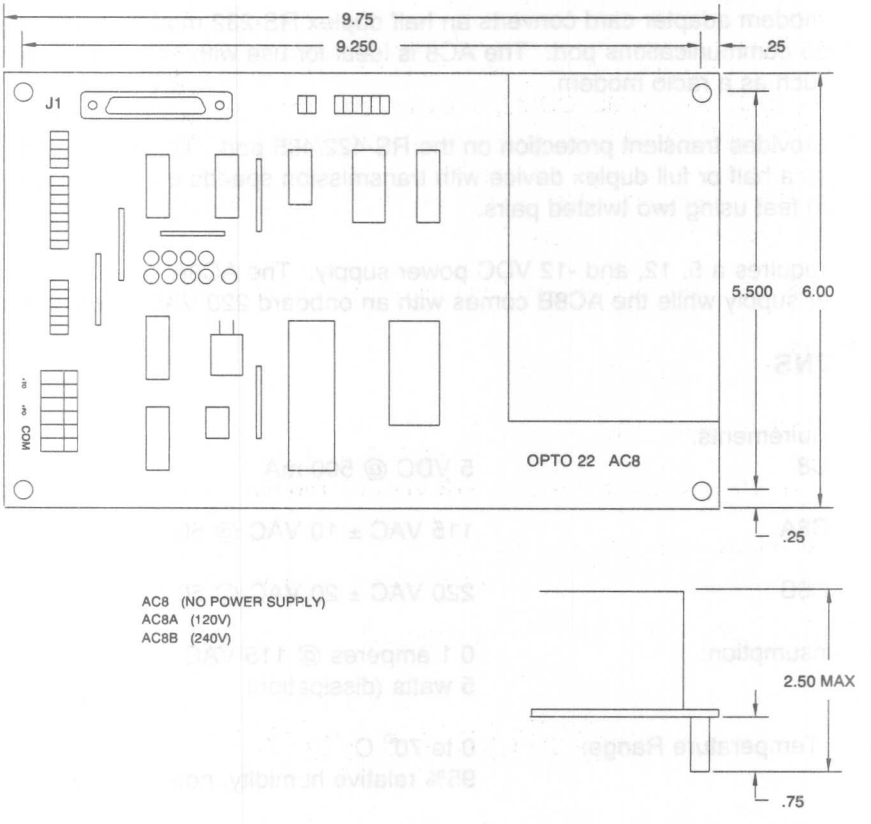
The AC8 provides transient protection on the RS-422/485 port. The modem adapter card operates as a half or full duplex device with transmission speeds up to 9,600 baud for distances up to 5,000 feet using two twisted pairs.

The AC8 requires a 5, 12, and -12 VDC power supply. The AC8A includes an onboard 115 VAC power supply while the AC8B comes with an onboard 220 VAC power supply.

SPECIFICATIONS

Power Requirements:	
AC8	5 VDC @ 500 mA
AC8A	115 VAC ± 10 VAC @ 50 - 60 Hz
AC8B	220 VAC ± 20 VAC @ 50 - 60 Hz
Power Consumption:	0.1 amperes @ 115 VAC 5 watts (dissipation)
Operating Temperature Range:	0 to 70° C 95% relative humidity, non-condensing
Isolation:	None
Interface:	
RS-232C	25-pin, D-shell female connector
RS-422/485	4-40 screw terminals
Baud Rate:	Up to 9,600 baud
Distance:	
RS-232C	Up to 50 feet
RS-422/485	Up to 5,000 feet
Communications:	Half or full duplex over two twisted pairs
Indicators:	Transmit, receive, RTS, CTS, DCD, DCR, and power

DIMENSIONS



AC8 (NO POWER SUPPLY)
AC8A (120V)
AC8B (240V)

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IBM PC BUS RS-422/485 ADAPTER WITH ISOLATION

AC24
AC24AT

DESCRIPTION

The AC24 is an RS-422/485 adapter card which plugs directly into the IBM PC bus and provides up to 4,000 VAC isolation between the PC bus and the communications link. The AC24 is also transient protected, features bi-directional handshake lines for RTS and CTS, and can drive up to 100 devices on a multidrop network. The AC24 adapter card can be jumpered for operation as COM1, COM2, COM3, or COM4 and offers full hardware and software compatibility with IBM PC, XT, PS/2 Models 25 and 30, and compatible computers.

The AC24 operates as a full duplex device with transmission speeds up to 38,400 baud for distances up to 5,000 feet using two twisted pairs and a ground.

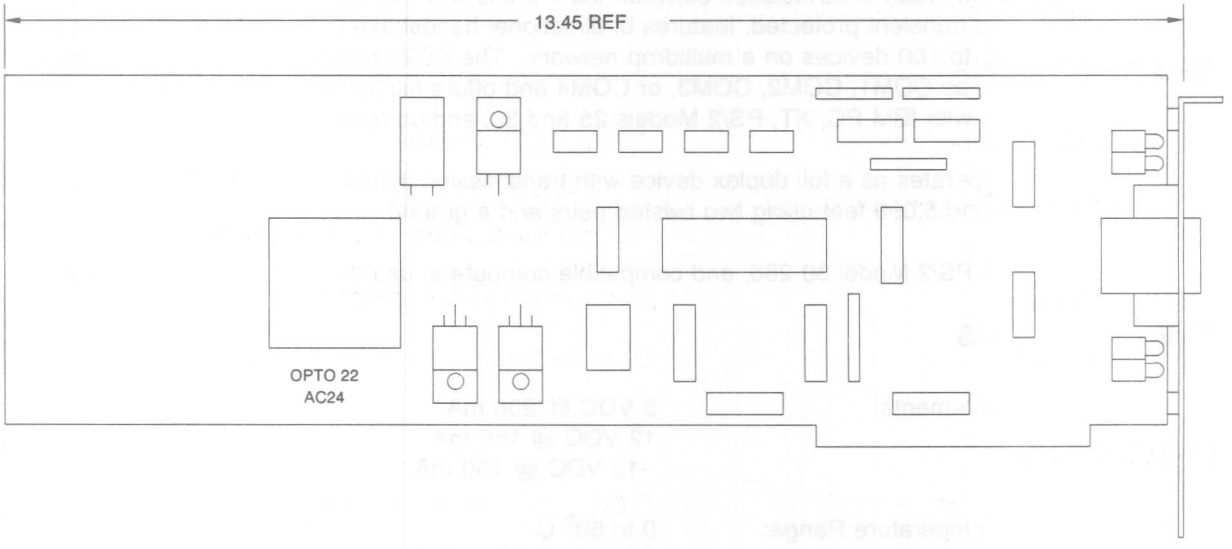
For IBM AT, PS/2 Model 30 286, and compatible computers, use the AC24AT adapter card.

SPECIFICATIONS

Power Requirements:	5 VDC @ 250 mA 12 VDC @ 150 mA -12 VDC @ 150 mA
Operating Temperature Range:	0 to 60° C 95% relative humidity, non-condensing
Isolation:	4,000 VAC
Interface:	RS-422/485 (9-pin, D-shell female connector)
Baud Rate:	Up to 38,400 baud
Distance:	Up to 5,000 feet
Communications:	Full duplex over two twisted pairs and a ground Additional twisted pairs for RTS and CTS
Indicators:	Transmit, receive, RTS, and CTS

NOTE: For compatibility information, see the RS-422/485 Adapter Card Selection Guide on page 2 - 22.

DIMENSIONS



IBM PC BUS TO PAMUX BUS ADAPTER AC28

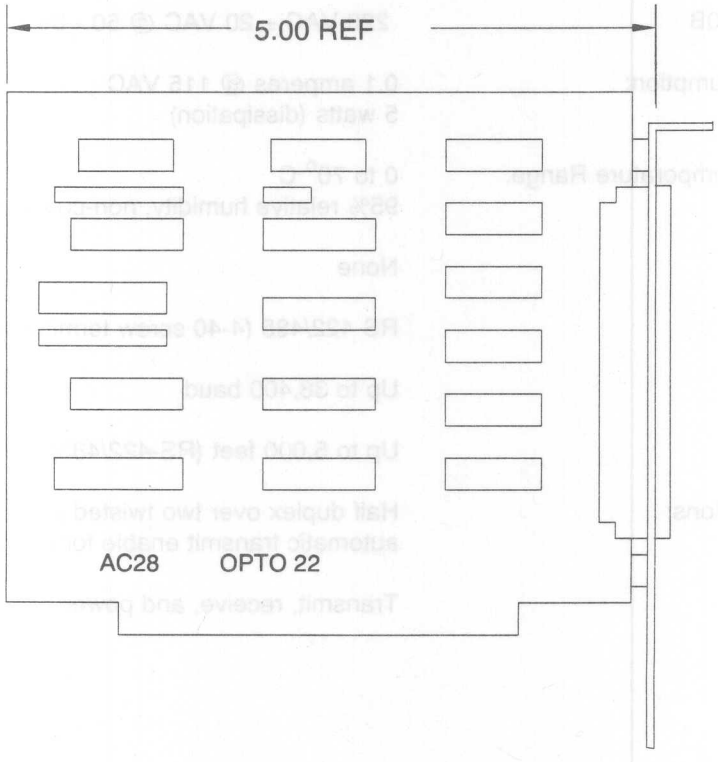
DESCRIPTION

The AC28 is an IBM PC bus to PAMUX adapter card. Each AC28 adapter card can drive up to 512 digital I/O points, 512 analog I/O points, or a combination thereof over a total distance of 500 feet. Up to four AC28 adapter cards can be installed in one IBM PC/XT/AT, PS/2 Model 25, 30, 30 286, or compatible computers.

SPECIFICATIONS

Power Requirements:	5 VDC @ 1.5 amperes
Operating Temperature Range:	0 to 60° C 95% relative humidity, non-condensing
Interface:	50-pin male header connector
Distance:	Up to 500 feet

DIMENSIONS



DESCRIPTION

The AC30A/B adapter card provides the ability to extend your multidrop communications link beyond 5,000 feet and also allows branching from an RS-422/485 link. When used as a repeater, the AC30 re-transmits data on the link, extending the total cable length an additional 5,000 feet. A star configuration network can also be implemented using up to 100 AC30A/B adapter cards on a single link.

The AC30A/B operates at baud rates up to 38,400 baud in a half duplex mode using two twisted pairs.

The AC30A includes an onboard 115 VAC power supply and the AC30B includes a 220 VAC power supply.

SPECIFICATIONS

Power Requirements:	
AC30A	115 VAC ± 10 VAC @ 50 - 60 Hz
AC30B	220 VAC ± 20 VAC @ 50 - 60 Hz
Power Consumption:	0.1 amperes @ 115 VAC 5 watts (dissipation)
Operating Temperature Range:	0 to 70° C 95% relative humidity, non-condensing
Isolation:	None
Interface:	RS-422/485 (4-40 screw terminals)
Baud Rate:	Up to 38,400 baud
Distance:	Up to 5,000 feet (RS-422/485)
Communications:	Half duplex over two twisted pairs with automatic transmit enable for multidrop
Indicators:	Transmit, receive, and power

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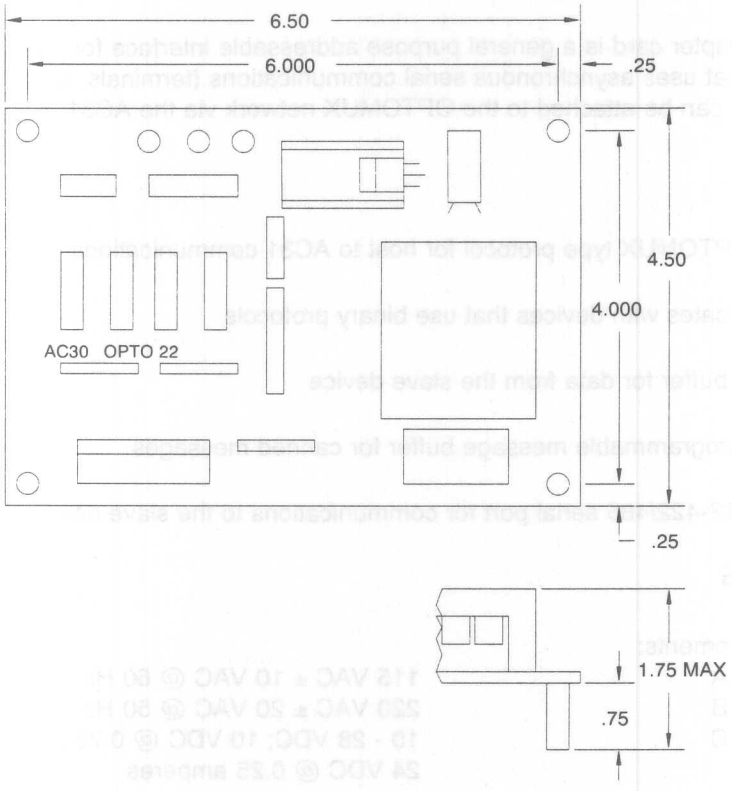
DIMENSIONS



INTELLIGENT OPTOMUX NETWORK INTERFACE ADAPTER

AC31A
AC31B
AC31C

DESCRIPTION

The AC31 adapter card is a general purpose addressable interface for the OPTOMUX network. Any device that uses asynchronous serial communications (terminals, printers, bar code readers, etc.) can be attached to the OPTOMUX network via the AC31.

FEATURES

- Simple OPTOMUX type protocol for host to AC31 communications
- Communicates with devices that use binary protocols
- 16K byte buffer for data from the slave device
- 8K byte programmable message buffer for canned messages
- RS-232/RS-422/485 serial port for communications to the slave device

SPECIFICATIONS

Power Requirements:		
	AC31A	115 VAC ± 10 VAC @ 60 Hz
	AC31B	220 VAC ± 20 VAC @ 50 Hz
	AC31C	10 - 28 VDC; 10 VDC @ 0.75 amperes, 24 VDC @ 0.25 amperes
Power Dissipation:		Less than 4 watts @ 25° C
Operating Temperature Range:		0 to 70° C 95% relative humidity, non-condensing
Interface:		One full duplex RS-422/485 serial port, One full duplex selectable RS-232 and RS422/485 serial port
Baud Rate:		300, 1200, 2400, 4800, 9600, 19200, and 38400 baud
CPU:		64180 8-bit microprocessor
CPU Clock Frequency:		6.144 MHz
EPROM:		32K bytes
RAM:		32K bytes
Indicators:		Transmit, receive, and power
Options:	Jumper selectable	- Address (0 to 255) - Baud rates - Terminating and biasing resistors

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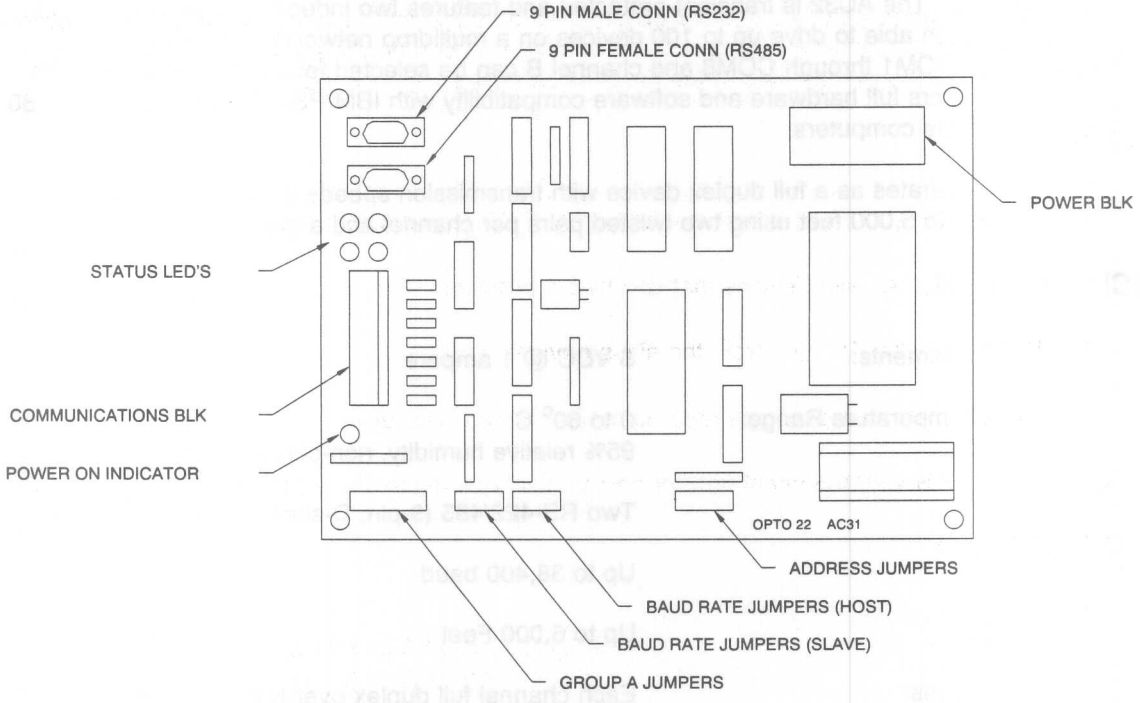
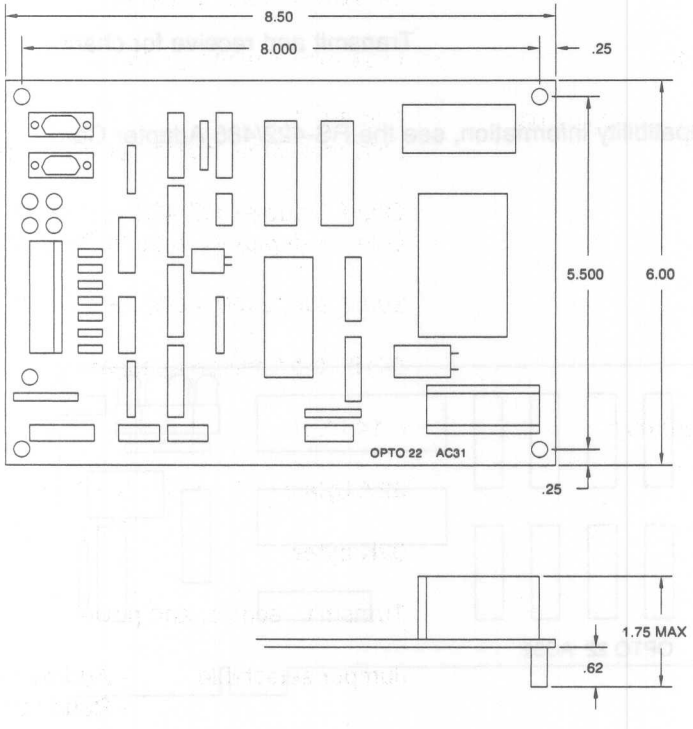
DIMENSIONS


9 PIN MALE CONN (RS232)
9 PIN FEMALE CONN (RS485)
POWER BLK
STATUS LED'S
COMMUNICATIONS BLK
POWER ON INDICATOR
OPTO 22 AC31
ADDRESS JUMPERS
BAUD RATE JUMPERS (HOST)
BAUD RATE JUMPERS (SLAVE)
GROUP A JUMPERS


8.50
8.000
.25
5.500
6.00
OPTO 22 AC31
.25
1.75 MAX
.62

DUAL RS-422/485 ADAPTER FOR MICRO CHANNEL COMPUTERS — AC32

DESCRIPTION

The AC32 is a dual RS-422/485 adapter card which plugs directly into the IBM PS/2 Micro Channel bus. The AC32 is transient protected and features two independent asynchronous channels (each able to drive up to 100 devices on a multidrop network). Channel A can be selected for COM1 through COM8 and channel B can be selected for COM2 through COM8. The AC32 offers full hardware and software compatibility with IBM PS/2 Models 50, 60, 70, 80, and compatible computers.

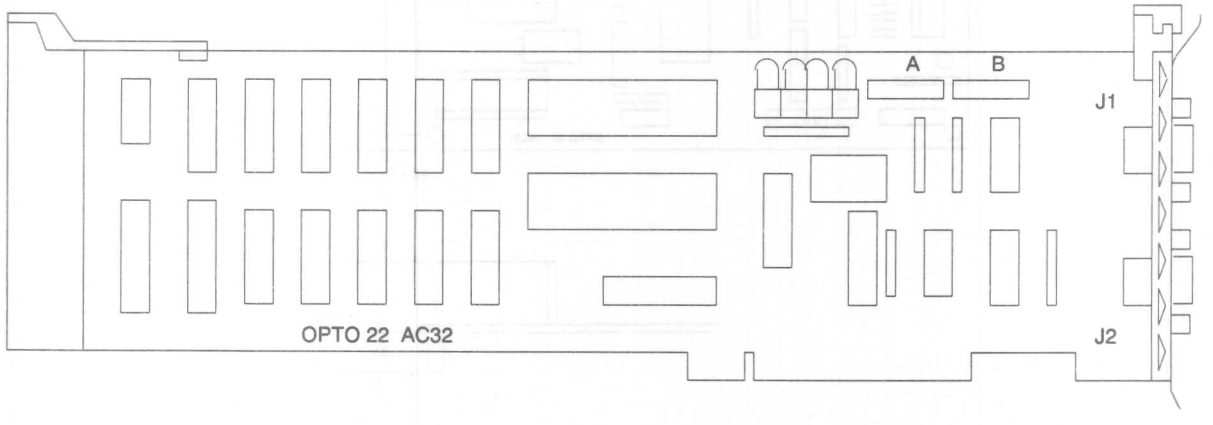
The AC32 operates as a full duplex device with transmission speeds up to 38,400 baud for distances up to 5,000 feet using two twisted pairs per channel and a ground.

SPECIFICATIONS

Power Requirements:	5 VDC @ 1 ampere
Operating Temperature Range:	0 to 60° C 95% relative humidity, non-condensing
Interface:	Two RS-422/485 (9-pin, D-shell female connector)
Baud Rate:	Up to 38,400 baud
Distance:	Up to 5,000 Feet
Communications:	Each channel full duplex over two twisted pairs and a ground
Indicators:	Transmit and receive for channels A and B

NOTE: For compatibility information, see the RS-422/485 Adapter Card Selection Guide on page 2 - 22.

DIMENSIONS



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PAMUX BUS ADAPTER FOR MICRO CHANNEL COMPUTERS

AC33

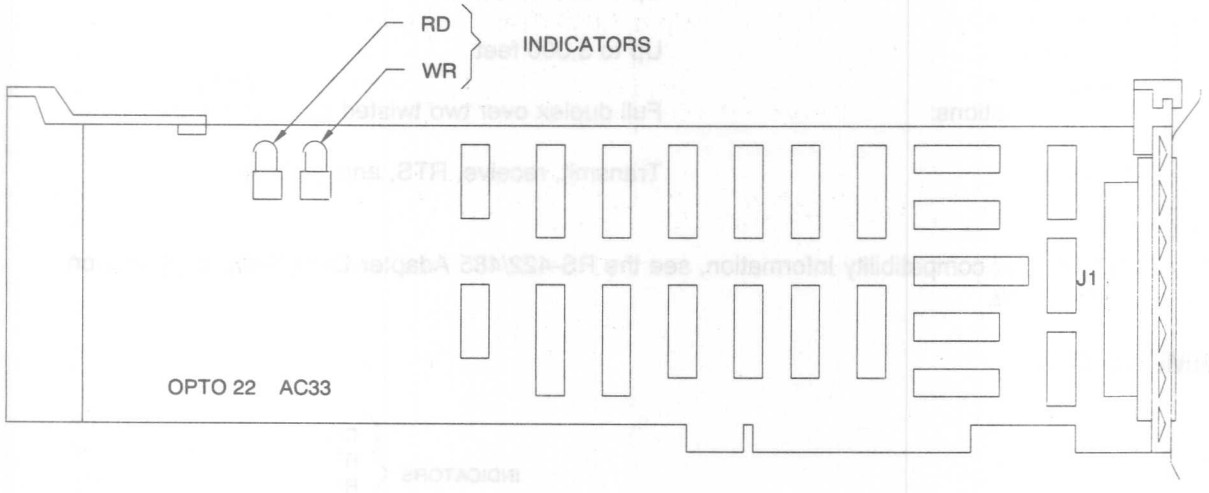
DESCRIPTION

The AC33 is an adapter card which plugs into the IBM PS/2 Micro Channel bus for interfacing to a PAMUX network. Each AC33 can drive up to 512 digital I/O points, 512 analog I/O points, or a combination thereof over a total distance of 500 feet.

SPECIFICATIONS

Power Requirements:	5 VDC @ 1.5 amperes
Operating Temperature Range:	0 to 60° C 95% relative humidity, non-condensing
Interface:	50-pin male header connector
Distance:	Up to 500 Feet

DIMENSIONS



ISOLATED RS-422/485 ADAPTER FOR MICRO CHANNEL COMPUTERS

AC34

DESCRIPTION

The AC34 is an isolated RS-422/485 adapter card which plugs directly into the IBM PS/2 Micro Channel bus. The AC34 is transient protected, can drive up to 100 devices on a multidrop network, and features bi-directional handshake lines for RTS and CTS. The AC34 adapter card can be configured for operation as COM1 through COM8 and offers full hardware and software compatibility with IBM PS/2 Models 50, 60, 70, 80, and compatible computers.

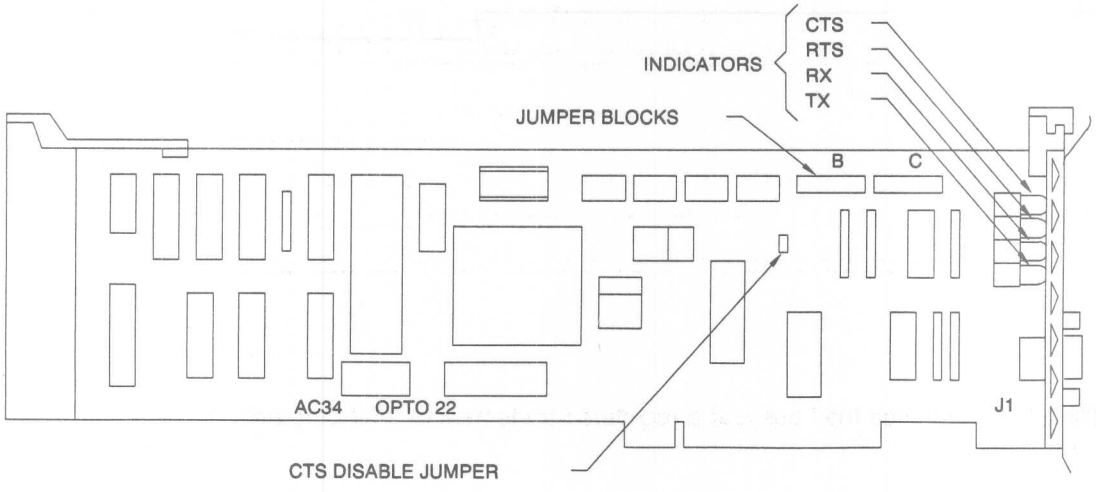
The AC34 operates as a full duplex device with transmission speeds up to 38,400 baud for distances up to 5,000 feet using two twisted pairs and a ground.

SPECIFICATIONS

Power Requirements:	5 VDC, 1 ampere
Operating Temperature Range:	0 to 60° C 95% relative humidity, non-condensing
Isolation:	4,000 VAC
Interface:	One RS-422/485 (9 pin D-shell female connector)
Baud Rate:	Up to 38,400 baud
Distance:	Up to 5,000 feet
Communications:	Full duplex over two twisted pairs and a ground
Indicators:	Transmit, receive, RTS, and CTS

NOTE: For compatibility Information, see the RS-422/485 Adapter Card Selection Guide on page 2 - 22.

DIMENSIONS



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TTL TO PAMUX 4 CONVERTER AC36

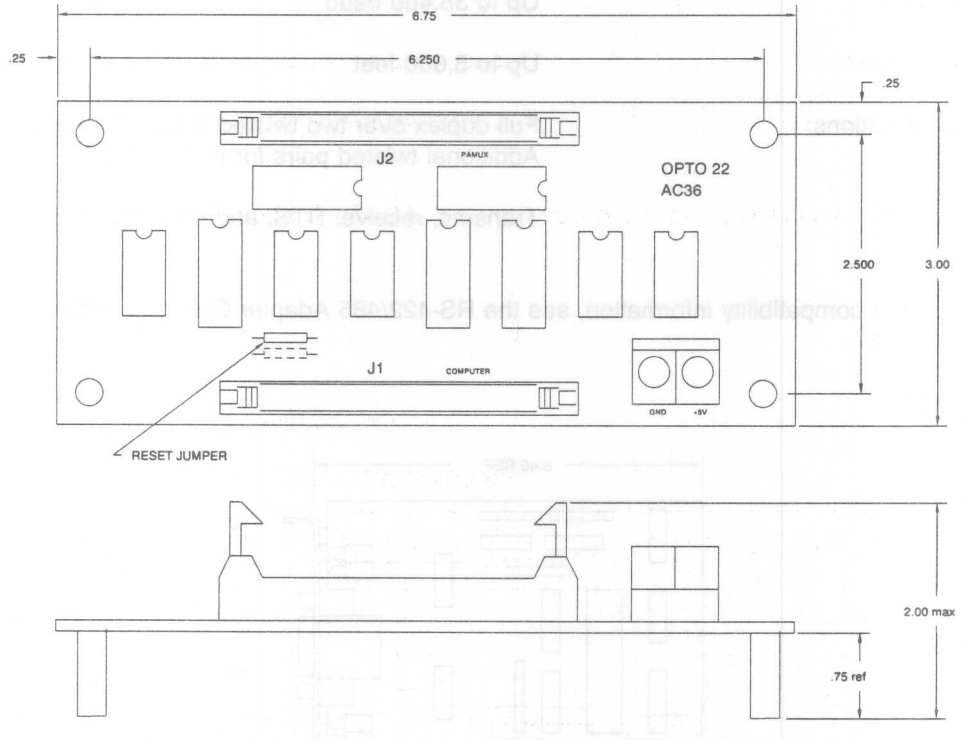
DESCRIPTION

The AC36 provides a PAMUX bus interface for a TTL parallel port. The AC36 can drive up to 512 discrete I/O points, 512 analog I/O points, or a combination thereof over a total distance of 500 feet. The AC36 connects to parallel interface ports which have a compatible pin-out to the connector on the EX2 daughter card. Compatible products include parallel port devices for MULTIBUS, STD, and VME bus products.

SPECIFICATIONS

Power Requirements:	5 VDC @ 1 ampere
Operating Temperature Range:	0 to 70° C 95% relative humidity, non-condensing
Interface:	Two 50-pin male header connectors (accepts HH series ribbon cable)
Distance:	Up to 500 feet

DIMENSIONS



MULTIBUS is a patented Intel bus and a registered trademark of Intel Corporation.

DESCRIPTION

The AC422 is a non-isolated RS-422/485 adapter card which plugs directly into the IBM PC bus. The AC422 is transient-protected, features bi-directional handshake lines for RTS and CTS, and can drive up to 100 devices on a multidrop network. The AC422 can be jumpered for operation as COM1, COM2, COM3, or COM4 and offers full hardware and software compatibility with IBM PC, XT, PS/2 Models 25 and 30, and compatible computers.

The AC422 operates as a full duplex device with transmission speeds up to 38,400 baud for distances up to 5,000 feet using two twisted pairs and a ground.

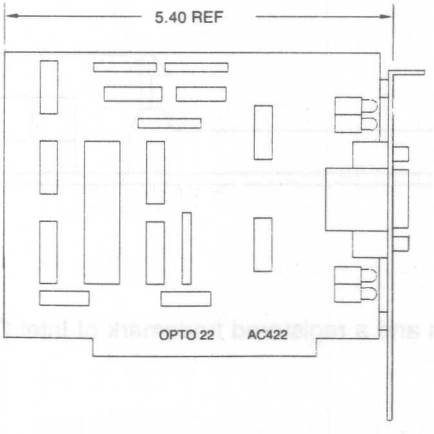
For IBM AT, PS/2 Model 30 286, and compatible computers, use the AC422AT adapter card.

SPECIFICATIONS

Power Requirements:	5 VDC @ 400 mA
Operating Temperature Range:	0 to 60° C 95% relative humidity, non-condensing
Isolation:	None
Interface:	RS-422/485 (9-pin, D-shell female connector)
Baud Rate:	Up to 38,400 baud
Distance:	Up to 5,000 feet
Communications:	Full duplex over two twisted pairs and a ground Additional twisted pairs for RTS and CTS
Indicators:	Transmit, receive, RTS, and CTS

NOTE: For compatibility information, see the RS-422/485 Adapter Card Selection Guide on page 2 - 22.

DIMENSIONS



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IEEE 488 TO PAMUX BUS ADAPTER IEEE488

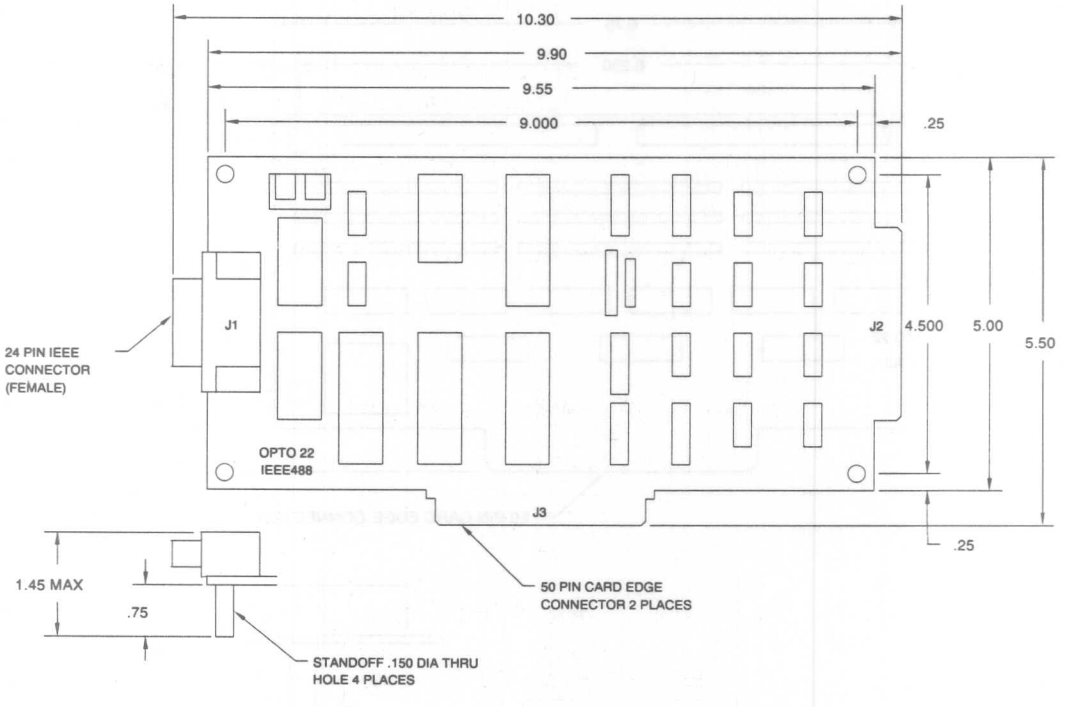
DESCRIPTION

The IEEE488 is an IEEE 488 adapter card to the PAMUX bus or to an 4, 8, 16, or 24 channel digital I/O mounting rack. Via the PAMUX bus each IEEE488 adapter can drive up to 512 digital I/O points, 512 analog I/O points, or a combination thereof over a total distance of 500 feet.

SPECIFICATIONS

Power Requirements:	5 VDC @ 2 amperes
Operating Temperature Range:	0 to 70° C 95% relative humidity, non-condensing
Interface:	
IEEE488	24-pin IEEE female connector
I/O mounting rack	50-pin male edge connector
PAMUX bus	50-pin male edge connector
Distance:	
PAMUX	Up to 500 feet
I/O mounting rack	Up to 10 feet

DIMENSIONS



UNIVERSAL INTERFACE TO PAMUX BUS ADAPTER — UCA2

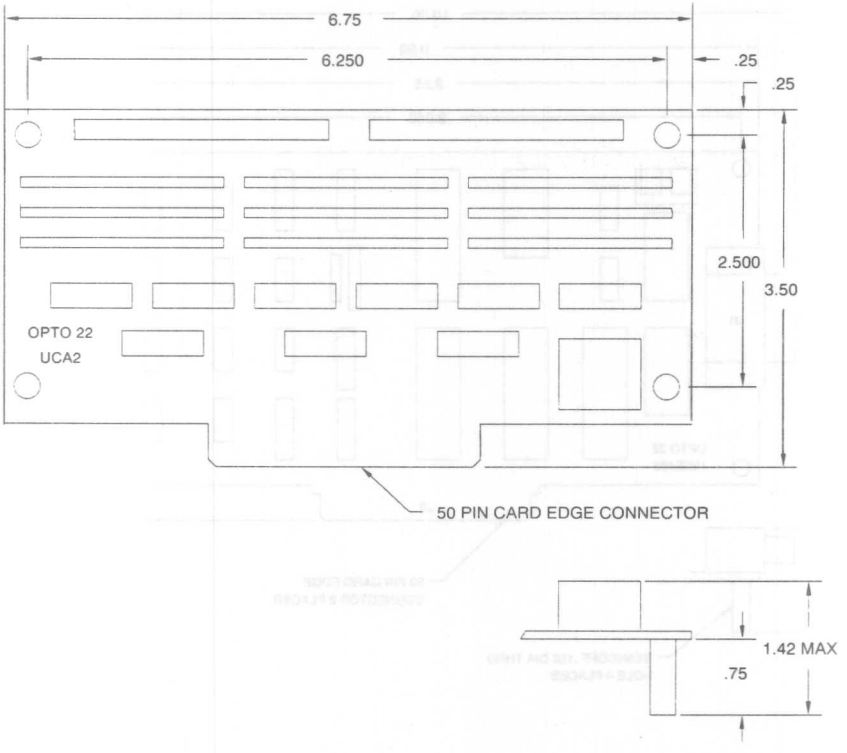
DESCRIPTION

The UCA2 adapter card allows any general purpose parallel port to be interfaced to the PAMUX bus. Wire-wrap sockets allow for customizing user logic (if necessary) and matching up signal pin assignments on the PAMUX bus. The UCA2 provides sufficient drive capability for up to 512 digital I/O points, 512 analog I/O points, or a combination thereof over a total distance of 500 feet.

SPECIFICATIONS

Power Requirements:	5 VDC @ 1.5 amperes
Operating Temperature Range:	0 to 70° C 95% relative humidity, non-condensing
Interface:	
PAMUX	50-pin male edge connector
Host	50-pin male header connector
Distance:	Up to 500 feet

DIMENSIONS



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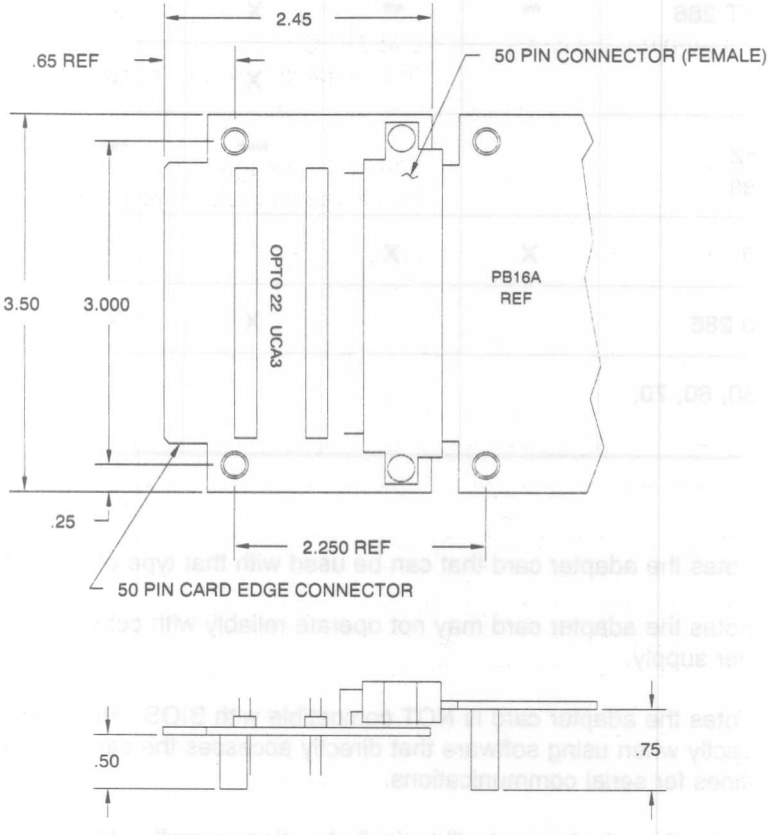
DESCRIPTION

The UCA3 adapter is a versatile adapter card designed to allow any parallel port configuration to connect to the Opto 22 I/O edge connected I/O mounting racks with a 50-conductor ribbon cable.

The card contains two 50-pin header connectors with wire-wrap posts. The wire-wrap header connectors can be cross-connected to the edge connectors as required for direct compatibility of the parallel port to the Opto 22 I/O mounting racks.

DIMENSIONS



OPTO 22
RS-422/485 ADAPTER CARD SELECTION GUIDE

COMPUTER TYPE VS ADAPTER CARDS

Computer Type/Adapter	AC24	AC422	AC24AT	AC422AT	AC32	AC34
PC	*	X				
XT	X	X				
8/10 MHz XT	X	X				
6 MHz AT or XT 286	**	**	X	X		
8 MHz AT			X	X		
10/12.5/16 MHz AT Compatibles			***	***		
PS/2 Model 30	X	X				
PS/2 Model 30 286			X	X		
PS/2 Models 50, 60, 70, & 80					X	X

X Denotes the adapter card that can be used with that type of computer.

* Denotes the adapter card may not operate reliably with computers having a 63.5 watt power supply.

** Denotes the adapter card is NOT compatible with BIOS. However, the card will operate correctly when using software that directly accesses the card and does not call any BIOS routines for serial communications.

*** Denotes the adapter card will typically function normally. However, with some machines performance may be erratic and cannot be guaranteed.

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SECTION 3

LOCAL CONTROLLERS

DESCRIPTION	MODEL	PAGE
Local Controller For OPTOMUX	LC2/A/DC	3 - 1
Local Controller With An Expansion Port	LC4A/B/DC	3 - 4
PAMUX Bus Daughter Card For A LC4	EX1	3 - 7
Serial/Parallel Daughter Card For A LC4	EX2	3 - 8

DESCRIPTION

The LC2 is a powerful, low cost, single board computer which performs the function of a local controller on an OPTOMUX intelligent I/O network. The LC2 can be programmed in either BASIC or FORTH. The BASIC interpreter is command set compatible with the IBM PC BASIC interpreter, except for commands related to screen and disk I/O. The OPTOWARE driver for communicating with an OPTOMUX network is also included in the LC2's Read Only Memory (ROM).

The LC2 includes an onboard 115 VAC power supply, the LC2A includes an onboard 220 VAC power supply, and the LC2DC requires a 10 to 28 VDC power source. The maximum inrush current for the LC2DC is three (3) amperes.

The LC2 Local Controller can be used to replace a host computer for stand-alone applications or several LC2's can be networked to a host computer for distributed applications. The following are several areas where LC2 and OPTOMUX can be applied:

Distributed Process Control
Remote Data Acquisition
Telemetry Systems
Energy Management

The use of an LC2 with or without OPTOMUX is ideal for performing the following functions:

- Remote Terminal Unit (RTU)
- PID Loop Controller
- Sequencer
- Data Logger
- Status Monitor
- Intelligent Terminal Controller
- Protocol Converter
- Intelligent Network Buffer

SPECIFICATIONS

HARDWARE

Power Requirements:	
LC2	115 VAC ± 10 VAC, 60 Hz
LC2A	220 VAC ± 20 VAC, 50 Hz
LC2DC	10 - 28 VDC, 750 mA @ 10 VDC, 250 mA @ 24 VDC
Power Dissipation:	Less than 2.5 watts @ 25° C
Operating Temperature:	0 to 70° C 95% relative humidity, non-condensing
Interface:	Two full duplex, RS-422/485 serial ports
Baud Rate:	300 to 38,400 baud
Distance (Multidrop):	Up to 5,000 feet total length Up to 100 LC2, LC4, or OPTOMUX stations
CPU:	Z80B 8-bit Microprocessor
CPU Clock Frequency:	4.9 MHz
EPROM:	32K bytes
RAM:	32K bytes CMOS with battery backup
Real-Time Clock:	Clock/Calendar with battery backup, 0.1 second resolution (Interrupt)
RAM/Clock Battery:	3 volt lithium, over 10 year life
Indicators:	Power, Host transmit and receive, and OPTOMUX transmit and receive
Options:	Jumper selectable - AutoRun feature - Baud rates - Termination and biasing resistors

SOFTWARE

IBM PC command compatible BASIC interpreter

FORTH interpreter (subset of FORTH-83 Standard)

OPTOWARE (OPTOMUX communications Driver)

Integer and IEEE floating-point arithmetic

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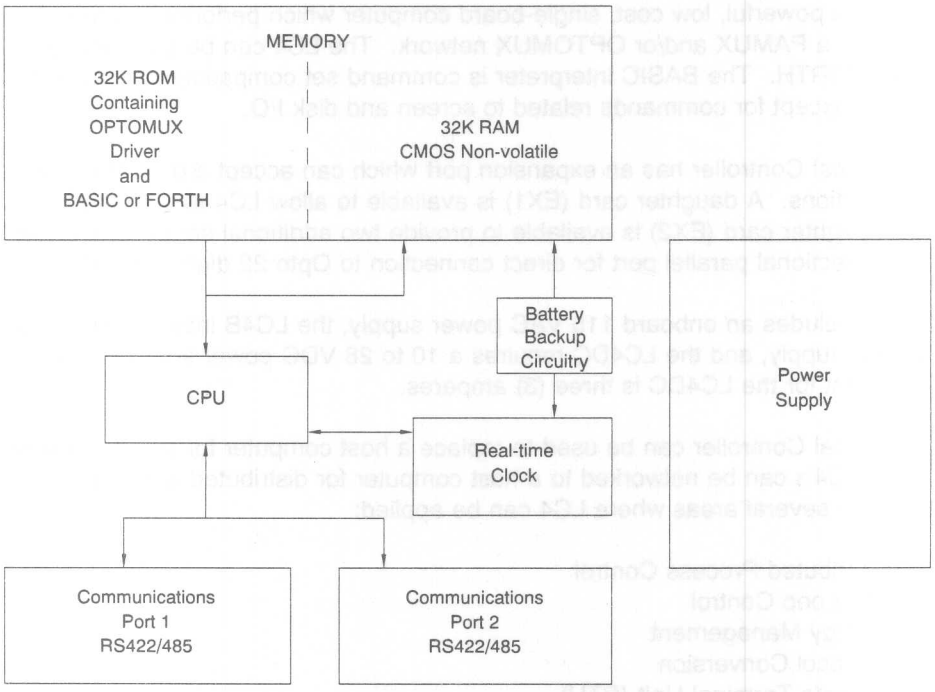
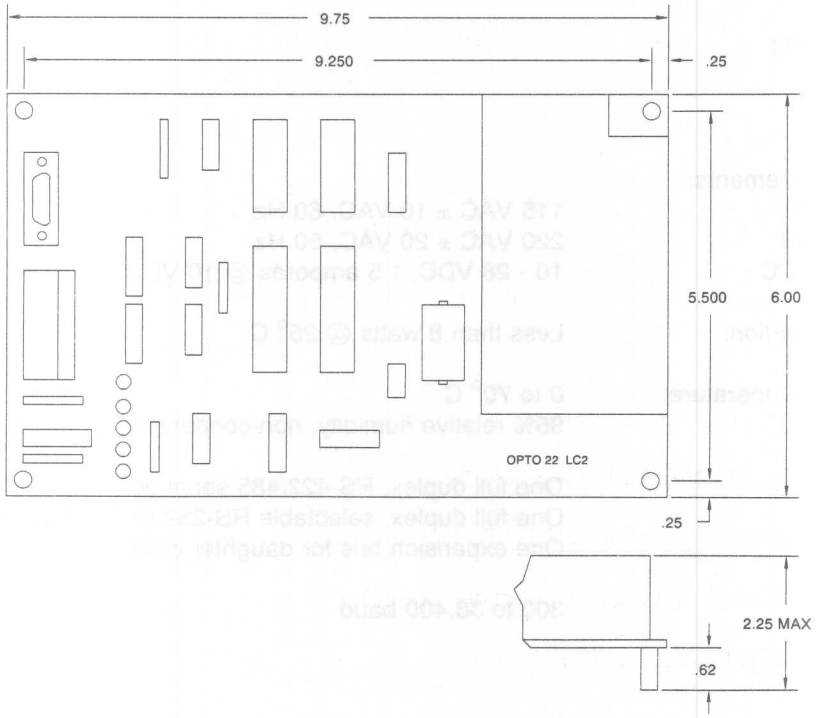
ARCHITECTURE



DIMENSIONS



LOCAL CONTROLLER WITH EXPANSION PORT

LC4A LC4B LC4DC

DESCRIPTION

The LC4 is a powerful, low cost, single-board computer which performs the function of a local controller on a PAMUX and/or OPTOMUX network. The LC4 can be programmed in either BASIC or FORTH. The BASIC interpreter is command set compatible with the IBM PC BASIC interpreter, except for commands related to screen and disk I/O.

The LC4 Local Controller has an expansion port which can accept a daughter card to provide various functions. A daughter card (EX1) is available to allow LC4 to control a PAMUX bus. Another daughter card (EX2) is available to provide two additional serial ports as well as a 24-bit, bi-directional parallel port for direct connection to Opto 22 digital I/O mounting racks.

The LC4A includes an onboard 115 VAC power supply, the LC4B includes an onboard 220 VAC power supply, and the LC4DC requires a 10 to 28 VDC power source. The maximum inrush current for the LC4DC is three (3) amperes.

The LC4 Local Controller can be used to replace a host computer for stand-alone applications or several LC4's can be networked to a host computer for distributed applications. The following are several areas where LC4 can be applied:

Distributed Process Control
PID Loop Control
Energy Management
Protocol Conversion
Remote Terminal Unit (RTU)
Data Acquisition
Machine Control

SPECIFICATIONS

HARDWARE

Power Requirements:	
LC4A	115 VAC ± 10 VAC, 60 Hz
LC4B	220 VAC ± 20 VAC, 50 Hz
LC4DC	10 - 28 VDC, 1.5 amperes @ 10 VDC, 0.50 amperes @ 24 VDC
Power Dissipation:	Less than 8 watts @ 25° C
Operating Temperature:	0 to 70° C 95% relative humidity, non-condensing
Interface:	One full duplex, RS-422/485 serial port One full duplex, selectable RS-232 or RS-422/485 port One expansion bus for daughter card
Baud Rate:	300 to 38,400 baud

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SPECIFICATIONS

HARDWARE (continued)

Distance:		
	RS-422/485	Up to 5,000 feet total length Up to 100 multidrop stations
	RS-232	Up to 50 feet
CPU:		64180, 8-bit microprocessor
CPU Clock Frequency:		6.144 MHz
EPROM:		32K bytes
RAM:		64K CMOS with battery backup (32K for the application program and 32K for a RAM disk)
Real-Time Clock:		Clock/Calendar with battery backup, 0.01 second resolution (Interrupt)
RAM/Clock Battery:		3 volt lithium, over 10 year life
Indicators:		Power, Host transmit and receive, and OPTOMUX transmit and receive
Options:	Jumper selectable	- AutoRun feature - Baud rates - LC4 address - Termination and biasing resistors

SOFTWARE

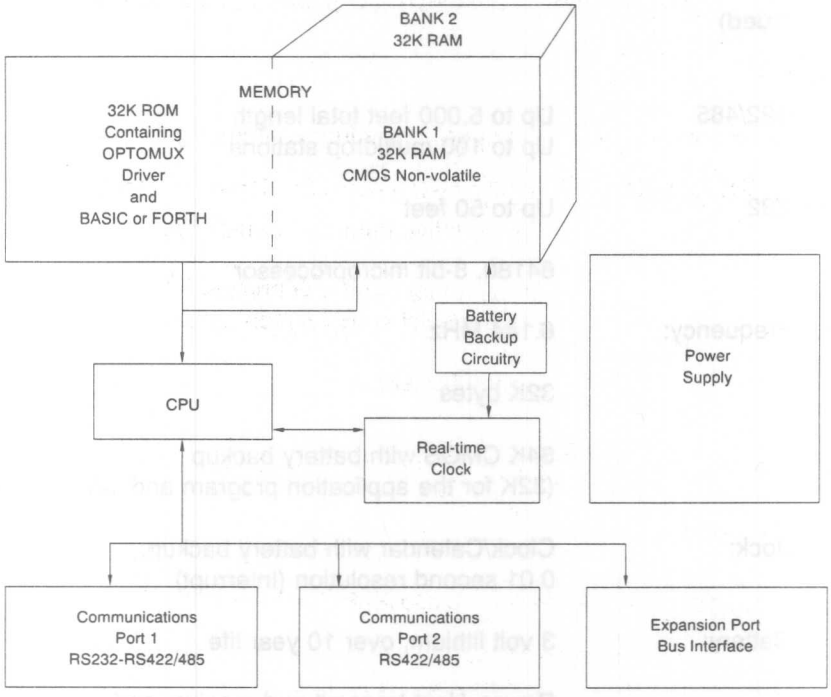
IBM PC command compatible BASIC interpreter

FORTH interpreter (subset of FORTH-83 Standard)

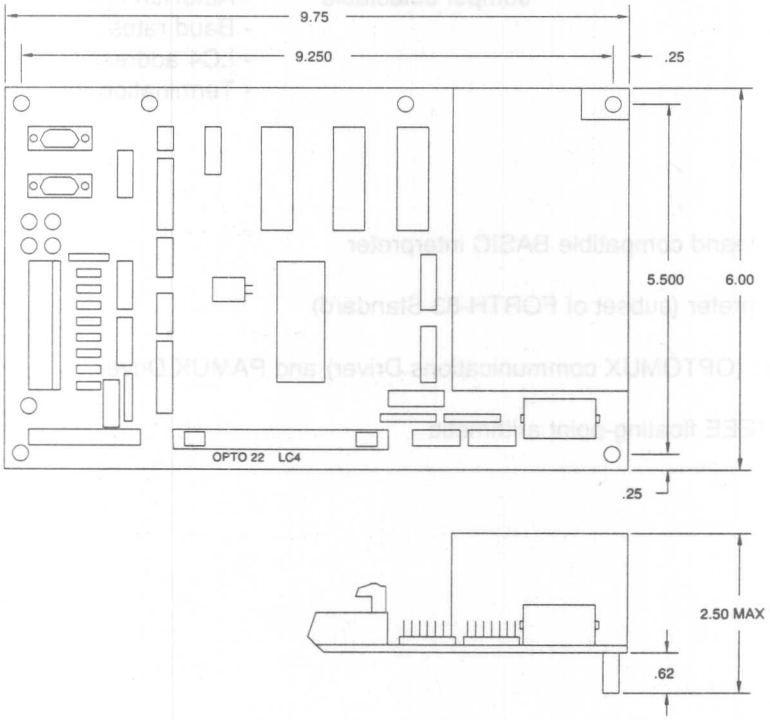
OPTOWARE (OPTOMUX communications Driver) and PAMUX Driver

Integer and IEEE floating-point arithmetic

ARCHITECTURE



DIMENSIONS



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PAMUX BUS DAUGHTER CARD FOR LC4 EX1

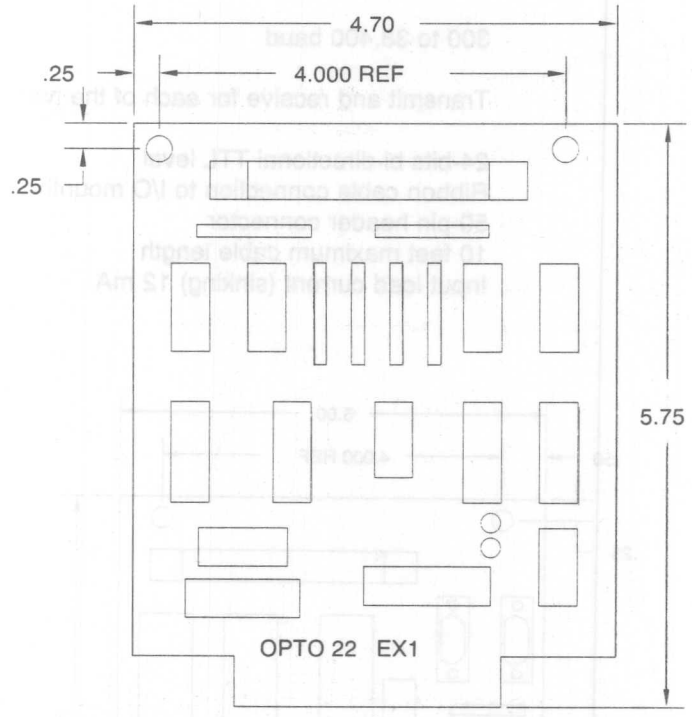
DESCRIPTION

The EX1 daughter card provides a PAMUX bus interface for the LC4. The EX1 can drive up to 512 digital I/O points, 512 analog I/O points, or a combination thereof over a total distance of 500 feet. The EX1 directly maps the PAMUX I/O points into the LC4 processor I/O space.

SPECIFICATIONS

Power Requirements:	1 ampere maximum sourced from LC4
Operating Temperature:	0 to 70° C 95% relative humidity, non-condensing
Interface:	50-pin male header connector (accepts HH series ribbon cable)
Distance:	Up to 500 feet

DIMENSIONS



SERIAL/PARALLEL DAUGHTER CARD FOR LC4 EX2

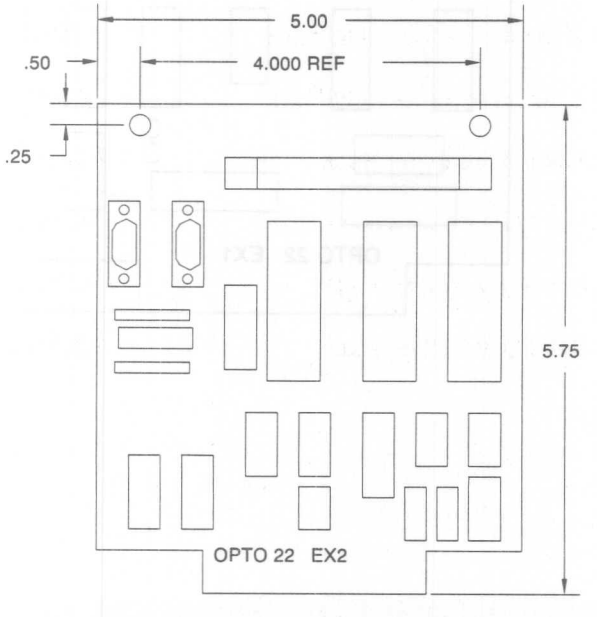
DESCRIPTION

The EX2 daughter card provides two independent serial communication ports and a parallel interface for LC4. One communication port can be RS-232 with full handshaking or a multidrop compatible RS-422/485. The second communication port is RS-422/485 only. The EX2 also provides 24, bi-directional, TTL level I/O lines for direct connection to a variety of Opto 22 I/O mounting racks. An HH series cable can be used to connect to I/O mounting racks having header connectors (PB4H, PB8H/HE, PB16H/HC/HE/HQ/J/K/L, or PB32HQ). An OD series cable can be used to connect to mounting racks with edge connectors (PB8, PB16A/C, or PB24/Q).

SPECIFICATIONS

Power Requirements:	600 mA maximum sourced from LC4
Operating Temperature:	0 to 70° C 95% relative humidity, non-condensing
Serial Ports:	One full duplex RS-422/485 serial port One full duplex selectable RS-232 and/or RS-422/485 port
Baud Rate:	300 to 38,400 baud
Indicators:	Transmit and receive for each of the two serial ports
Parallel Port:	24-bits bi-directional TTL level Ribbon cable connection to I/O mounting rack 50-pin header connector 10 feet maximum cable length Input load current (sinking) 12 mA

DIMENSIONS



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SECTION 4

DIGITAL I/O MOUNTING RACKS

DESCRIPTION	MODEL	PAGE
4 Position Single Channel I/O Mounting Rack	PB4	4 - 2
4 Position Single Channel I/O Mounting Rack	PB4H	4 - 4
4 Position Single Channel Output Mounting Rack	PB4R	4 - 8
8 Position Single Channel I/O Mounting Rack	PB8	4 - 10
8 Position Single Channel I/O Mounting Rack	PB8H	4 - 12
8 Position Single Channel I/O Mounting Rack	PB8HE	4 - 16
16 Position Single Channel I/O Mounting Rack	PB16A	4 - 20
16 Position Single Channel I/O Mounting Rack	PB16C	4 - 22
16 Position Single Channel I/O Mounting Rack	PB16H	4 - 24
16 Position Single Channel I/O Mounting Rack	PB16HC	4 - 28
16 Position Single Channel I/O Mounting Rack	PB16HE	4 - 32
16 Channel Quad Pak I/O Mounting Rack	PB16HQ	4 - 36
16 Position DC Input Channel Rack	PB16J/K	4 - 40
16 Position DC Output Channel Rack	PB16L	4 - 45
16 Position Single Channel I/O Mounting Rack	PB16T	4 - 50
24 Position Single Channel I/O Mounting Rack	PB24	4 - 52
24 Channel Quad Pak I/O Mounting Rack	PB24HQ	4 - 54
24 Channel Quad Pak I/O Mounting Rack	PB24Q	4 - 56
32 Channel Quad Pak I/O Mounting Rack	PB32DEC	4 - 58
32 Channel Quad Pak I/O Mounting Rack	PB32HQ	4 - 60

I/O MOUNTING RACKS

INTRODUCTION

Opto 22 offers a complete line of general purpose I/O mounting racks for the industry standard I/O modules. The I/O mounting racks include industrial barrier strips, LED indicators, pull-up resistors, and power fuses for each module. I/O mounting racks are available with a variety of standard interfaces to computers and also for direct connection. There are specific racks to accommodate the single channel I/O modules or the Quad Pak series of I/O modules. Standard I/O mounting rack sizes include 4, 8, 16, 24, and 32 channels per rack. Opto 22 I/O mounting racks are designed to operate at temperatures from 0 to 70° C, 95% relative humidity, non-condensing.

Single channel I/O modules can only be mounted in I/O mounting racks designated as "Single Channel." Quad Pak I/O modules can only be mounted in I/O mounting racks designated as "Four Channel."

OPTOMUX and PAMUX Brain Boards can only be mated to I/O mounting racks which have header connectors.

In addition to the standard I/O mounting racks, Opto 22 also offers DC Input and DC Output racks with the I/O circuitry integrated onto the rack. The Integral DC Input and Integral DC Output racks use a header connector for logic signals, making them ideal for use with OPTOMUX and PAMUX Brain Boards or a standard computer port.

BENEFITS

- Modules may be replaced without disturbing field wiring
- Removeable fuses protect module and power wiring against short circuits
- Board size may be matched to system requirements
- Allows use of any module in any position
- Can be mounted in 19" cabinets

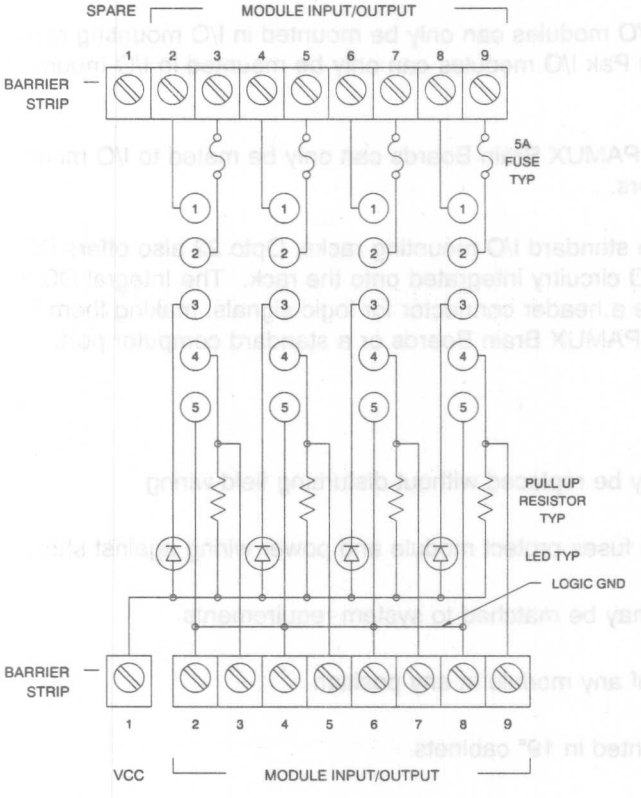
4 POSITION SINGLE CHANNEL I/O MOUNTING RACK

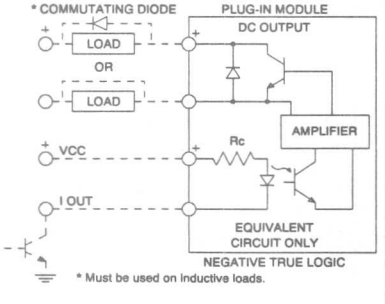
PB4

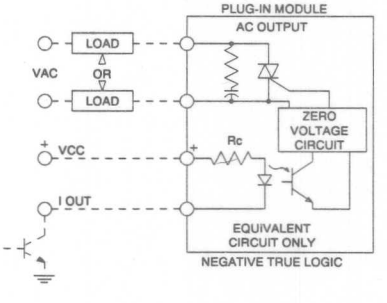
DESCRIPTION

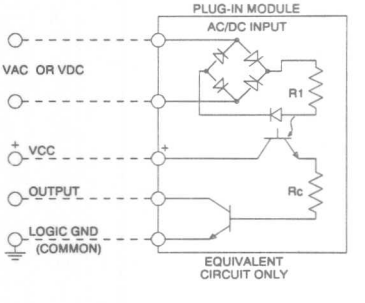
The PB4 I/O mounting rack is designed for use with single channel I/O modules in applications which require barrier strips on both the field and the logic sides.

SCHEMATIC









Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

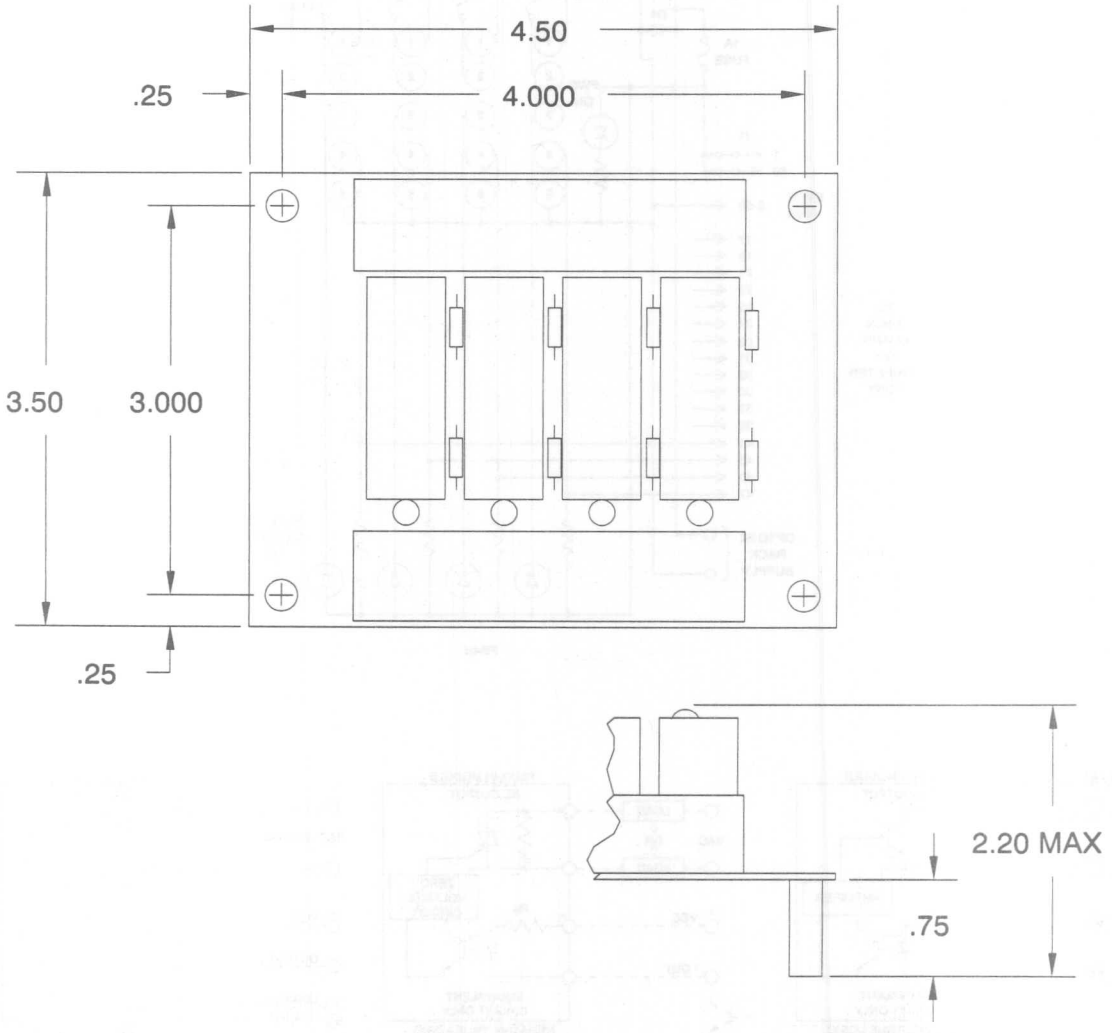
4 POSITION SINGLE CHANNEL I/O MOUNTING RACK

PB4

SPECIFICATIONS

Operating Temperature:	0 to 70° C 95% relative humidity, non-condensing
Interface Connector:	
Field	6-32 screw terminals
Logic	6-32 screw terminals

DIMENSIONS



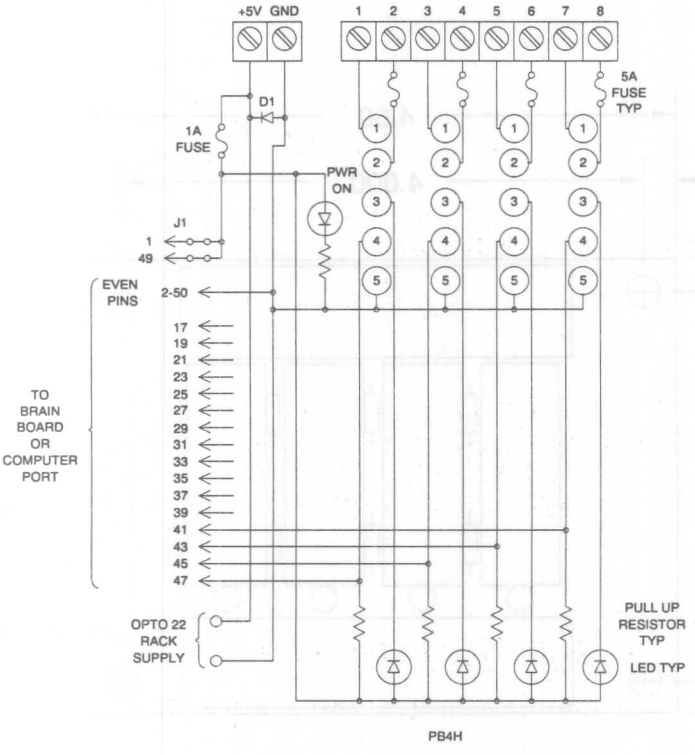
4 POSITION SINGLE CHANNEL I/O MOUNTING RACK

PB4H

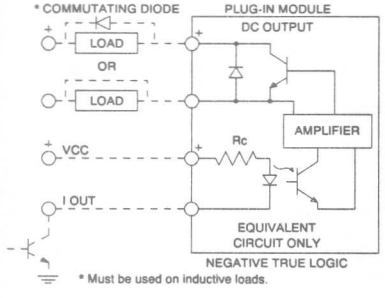
DESCRIPTION

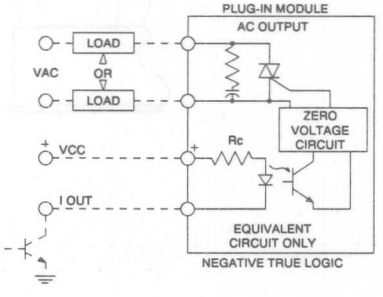
The PB4H I/O mounting rack features a 50-pin header connector for easy interface to computer I/O ports via 50-conductor ribbon cables. The 50-pin connector also allows direct connection to the OPTOMUX and PAMUX Brain Boards.

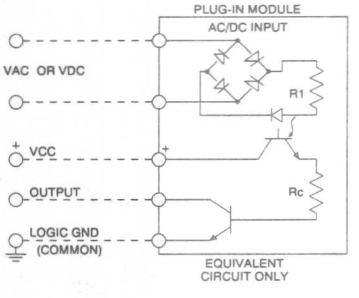
SCHEMATIC



PB4H







Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

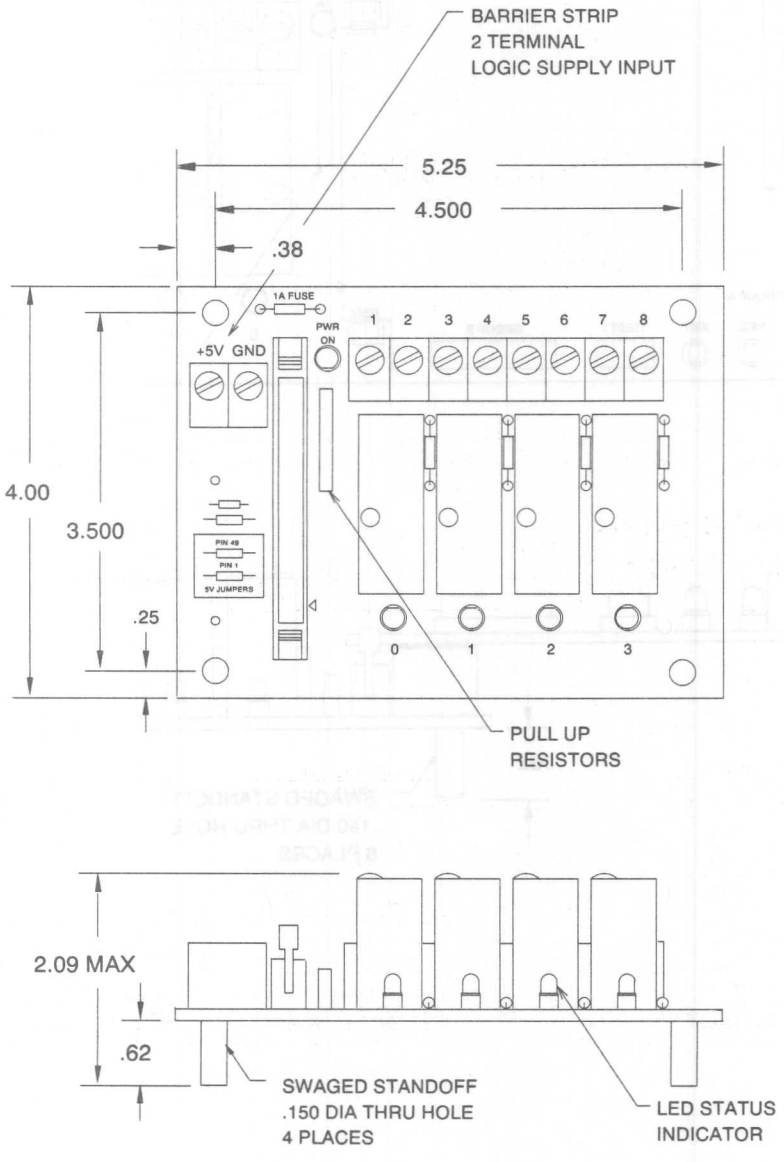
4 POSITION SINGLE CHANNEL I/O MOUNTING RACK

PB4H

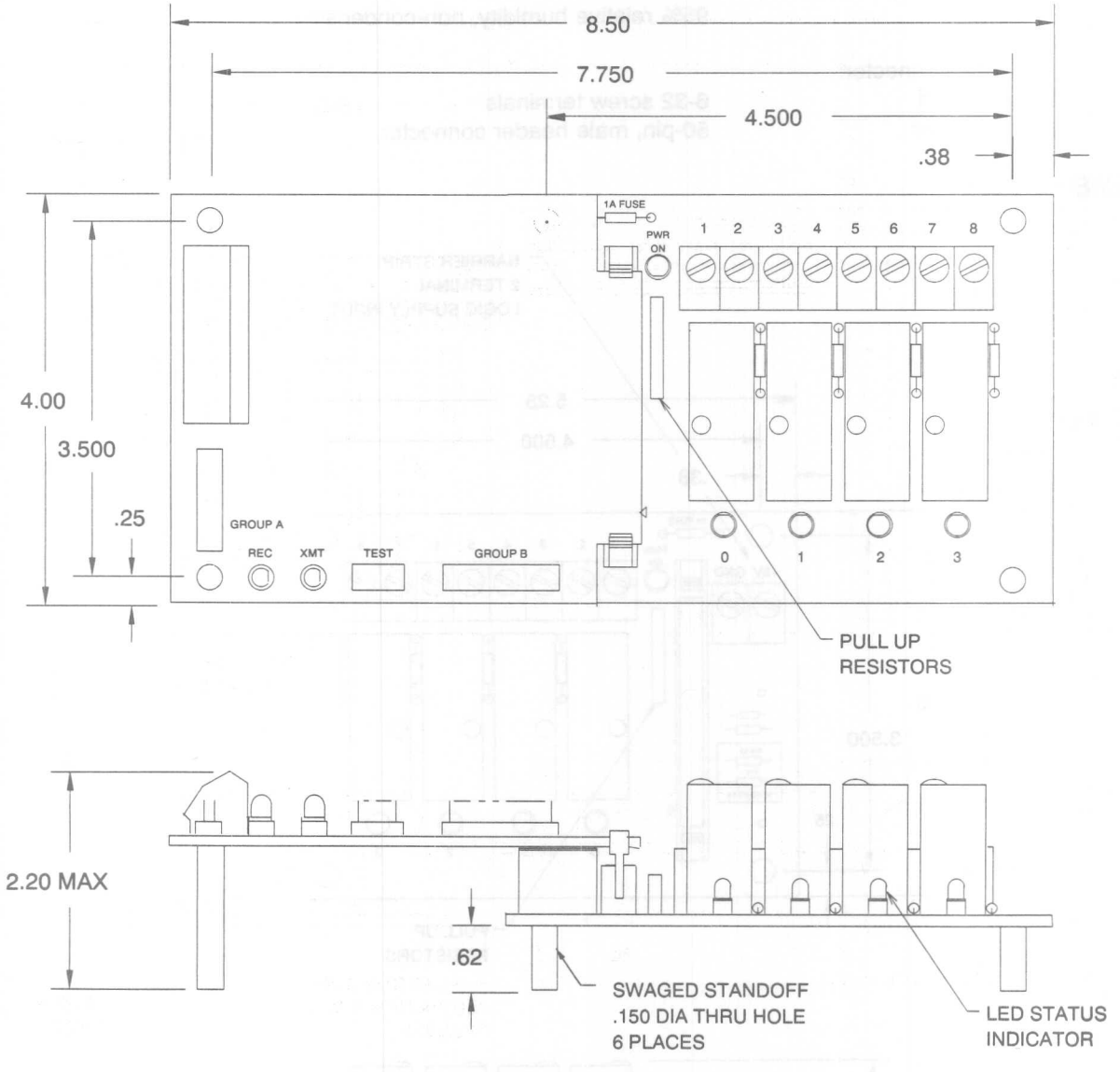
SPECIFICATIONS

Operating Temperature:	0 to 70° C 95% relative humidity, non-condensing
Interface Connector:	
Field	6-32 screw terminals
Logic	50-pin, male header connector

DIMENSIONS



DIMENSIONS WITH OPTOMUX BRAIN BOARD (P/N B1)

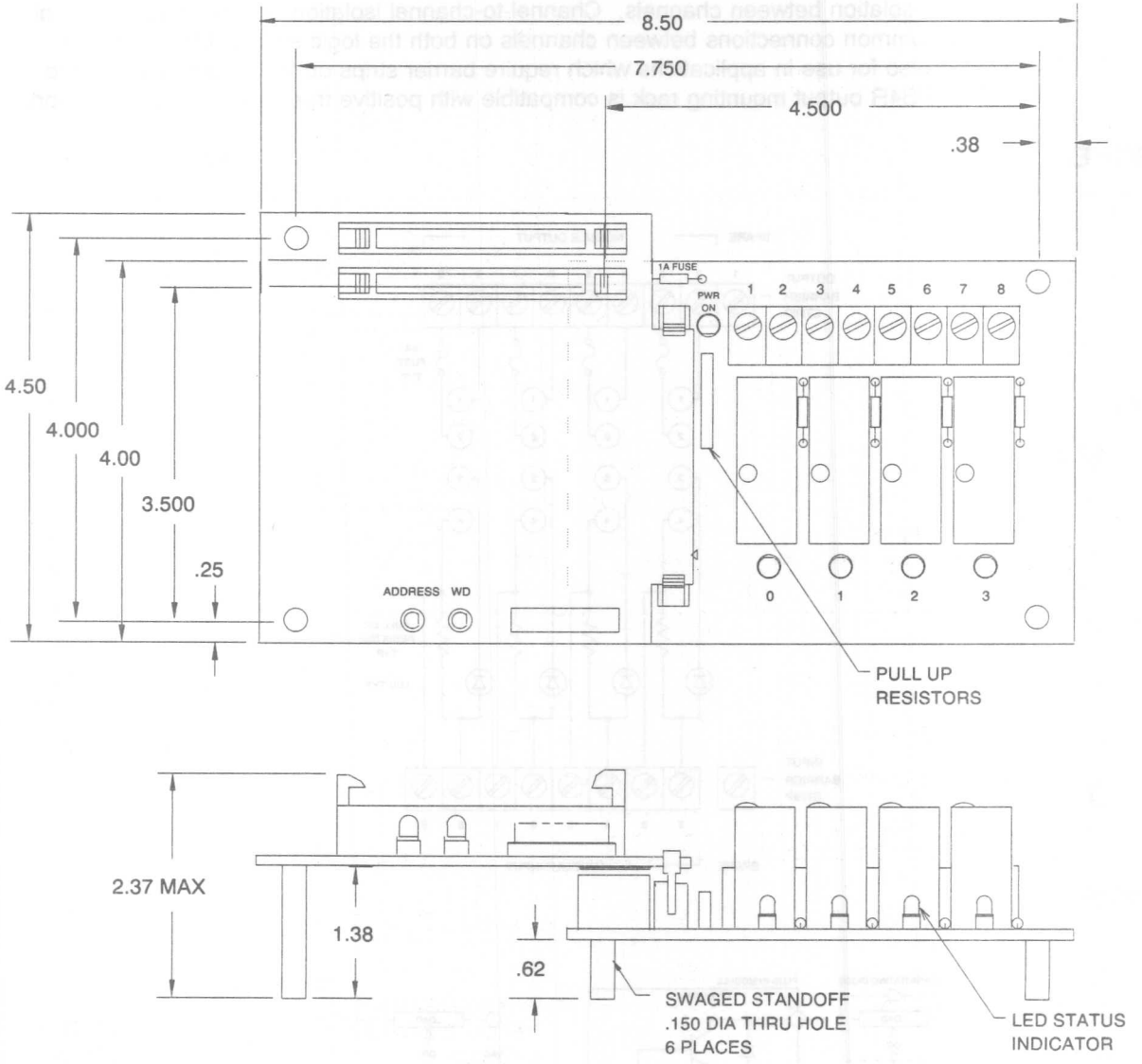


Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

4 POSITION SINGLE CHANNEL I/O MOUNTING RACK

PB4H

DIMENSIONS WITH PAMUX BRAIN BOARD (P/N B5)



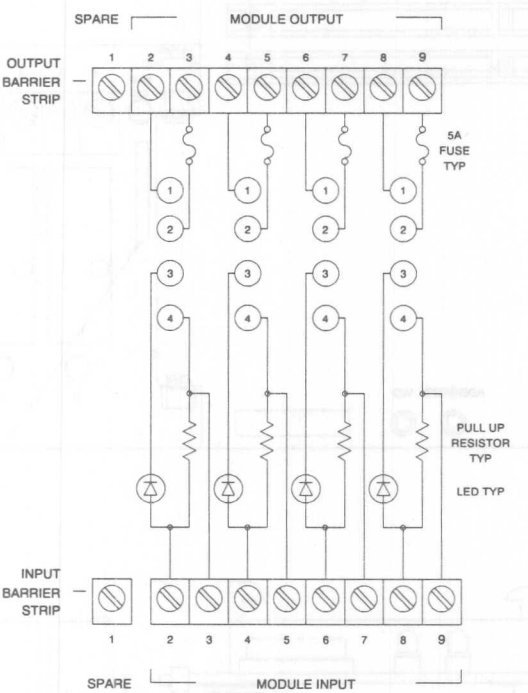
4 POSITION SINGLE CHANNEL OUTPUT MOUNTING RACK

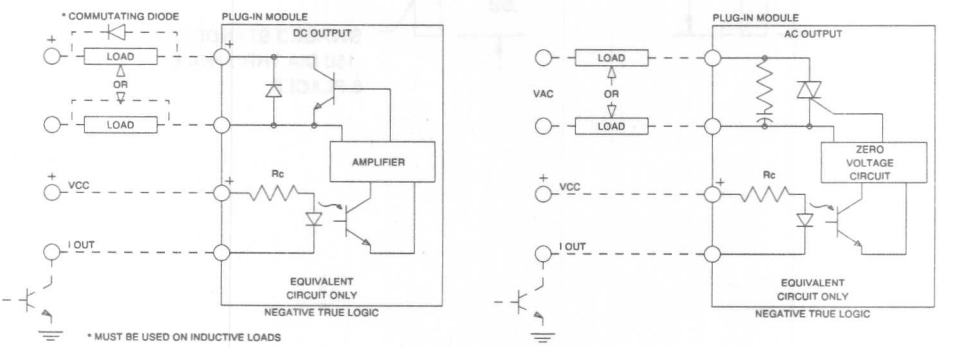
PB4R

DESCRIPTION

The PB4R output mounting rack is designed for use with single channel output modules only and features isolation between channels. Channel-to-channel isolation is accomplished by not having any common connections between channels on both the logic side and the field side. This rack is also for use in applications which require barrier strips on both the field and logic sides. The PB4R output mounting rack is compatible with positive true logic computer I/O ports.

SCHEMATIC





Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

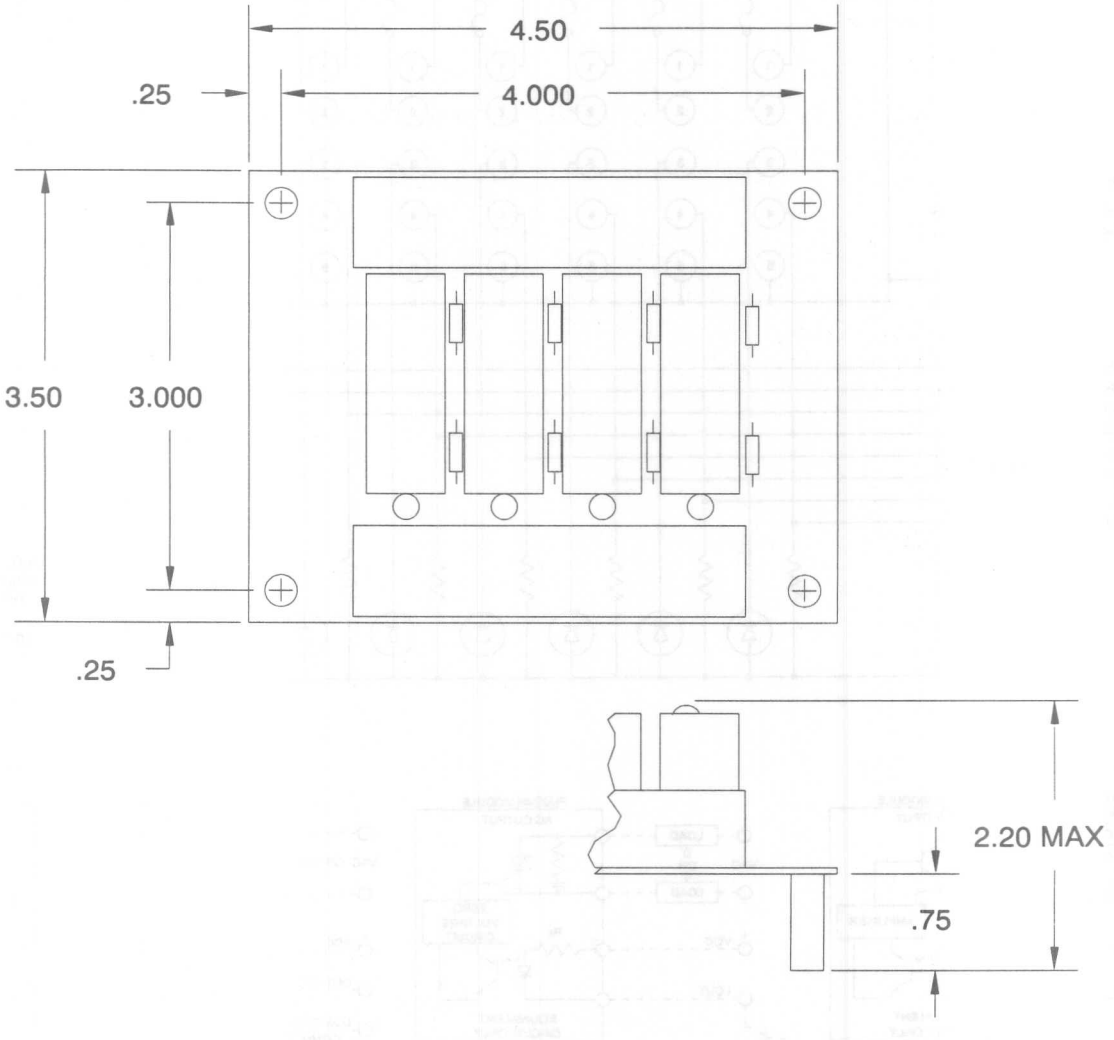
4 POSITION SINGLE CHANNEL OUTPUT MOUNTING RACK

PB4R

SPECIFICATIONS

Operating Temperature:	0 to 70° C 95% relative humidity, non-condensing
Interface Connector:	
Field	6-32 screw terminals
Logic	6-32 screw terminals

DIMENSIONS



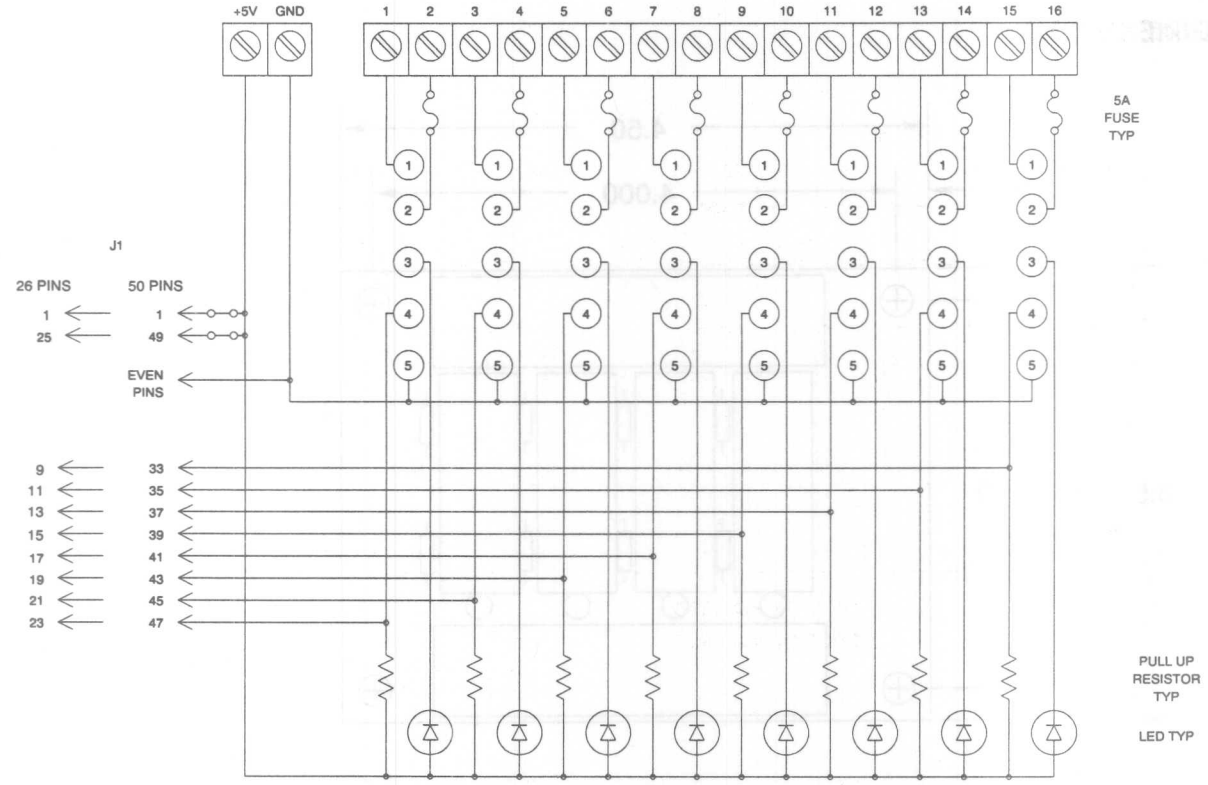
8 POSITION SINGLE CHANNEL I/O MOUNTING RACK

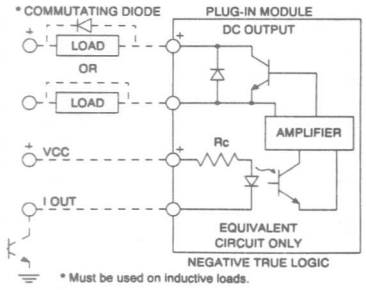
PB8

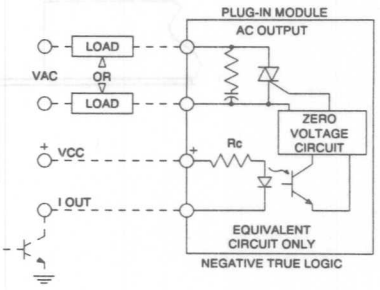
DESCRIPTION

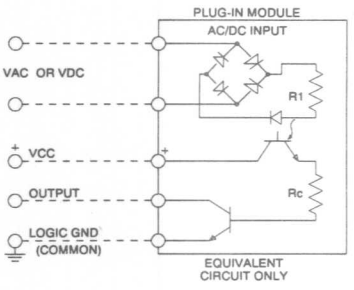
The PB8 I/O mounting rack can accommodate up to eight single channel I/O modules. The PB8 I/O mounting rack uses a 26- or 50-pin card edge connector for interface to computer I/O ports via a 50-conductor ribbon cable.

SCHEMATIC









Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

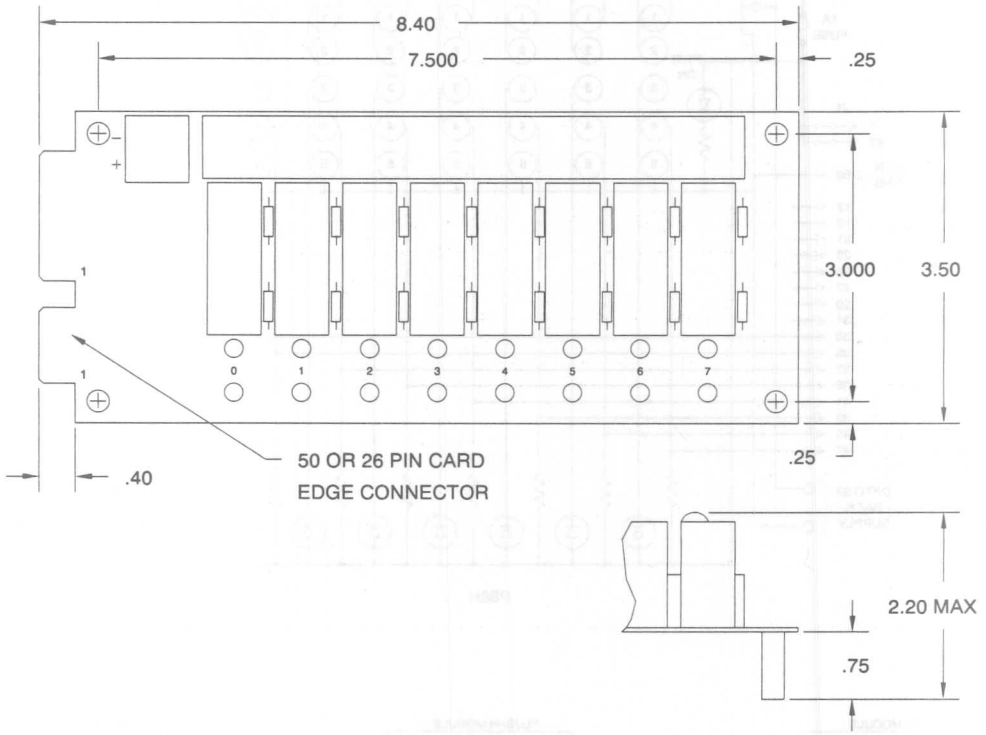
8 POSITION SINGLE CHANNEL I/O MOUNTING RACK

PB8

SPECIFICATIONS

Operating Temperature:	0 to 70° C
	95% relative humidity, non-condensing
Interface Connector:	
Field	6-32 screw terminals
Logic	26- or 50-conductor edge card connector

DIMENSIONS



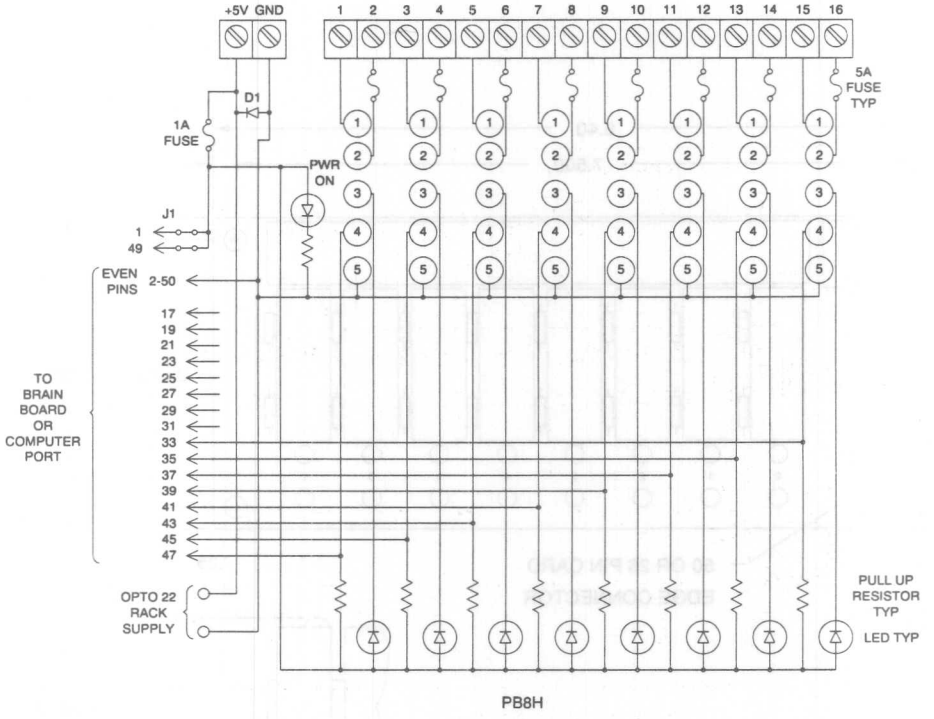
8 POSITION SINGLE CHANNEL I/O MOUNTING RACK

PB8H

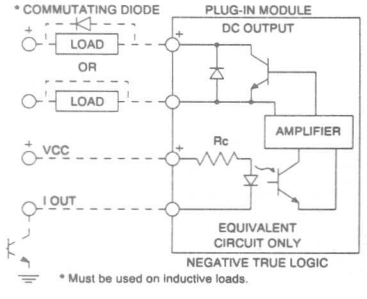
DESCRIPTION

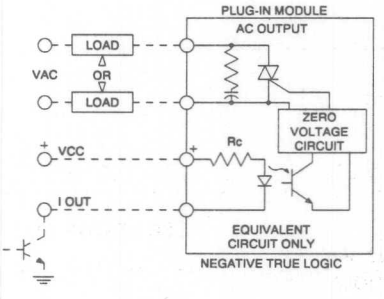
The PB8H I/O mounting rack can accomodate up to eight single channel I/O modules in any combination. The PB8H is designed to interface to either OPTOMUX or PAMUX Brain Boards via a 50-pin header connector. This 50-pin header connector also allows an easy connection to computer parallel I/O ports via a 50-conductor ribbon cable.

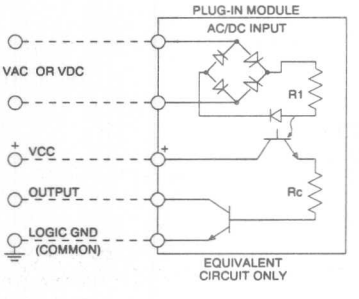
SCHEMATIC



PB8H







Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

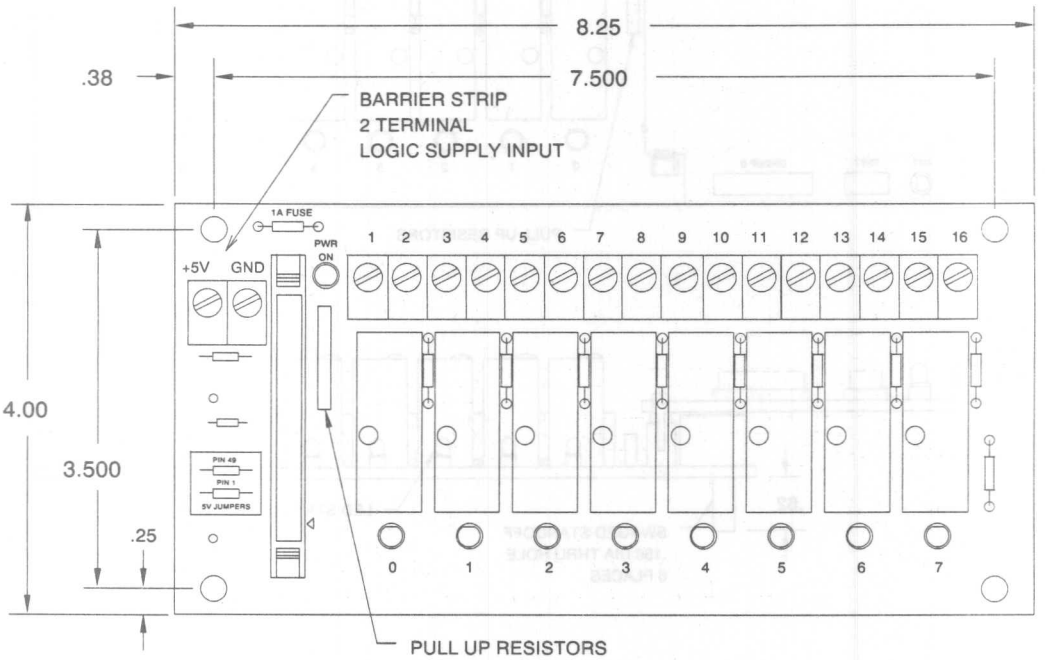
8 POSITION SINGLE CHANNEL I/O MOUNTING RACK

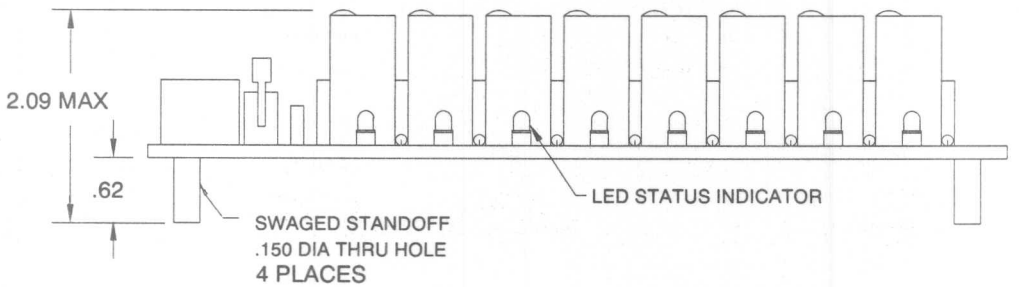
PB8H

SPECIFICATIONS

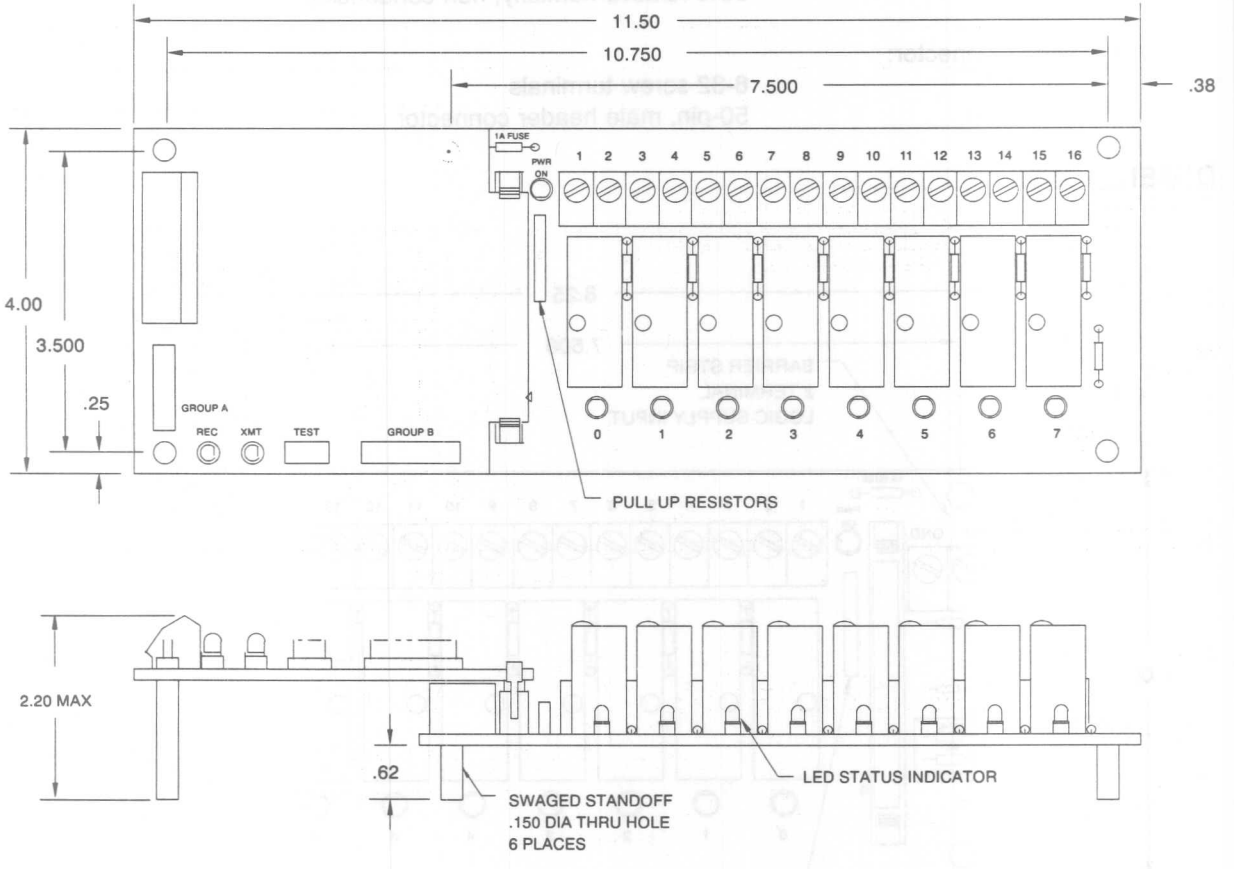
Operating Temperature:	0 to 70° C 95% relative humidity, non-condensing
Interface Connector:	
Field	6-32 screw terminals
Logic	50-pin, male header connector

DIMENSIONS



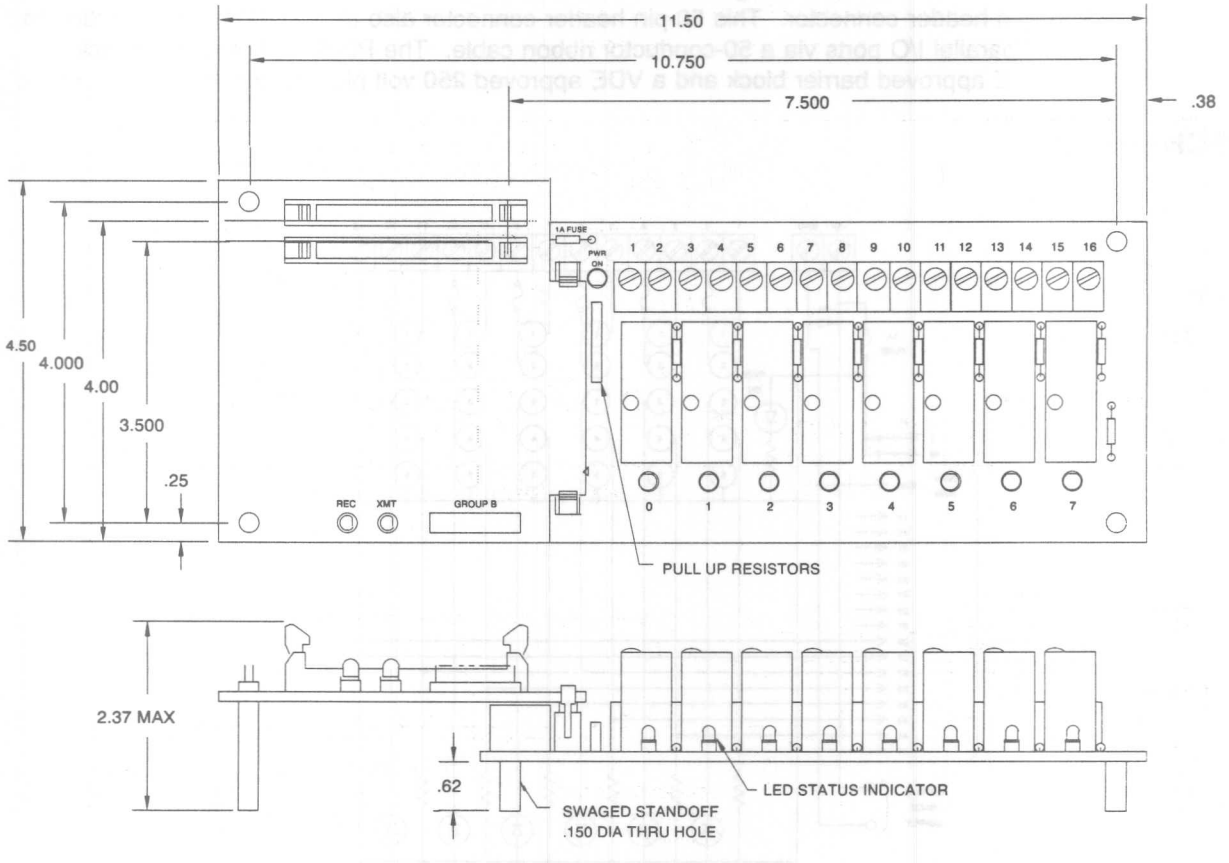


DIMENSIONS WITH OPTOMUX BRAIN BOARD (P/N B1)



Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

DIMENSIONS WITH PAMUX BRAIN BOARD (P/N B5)



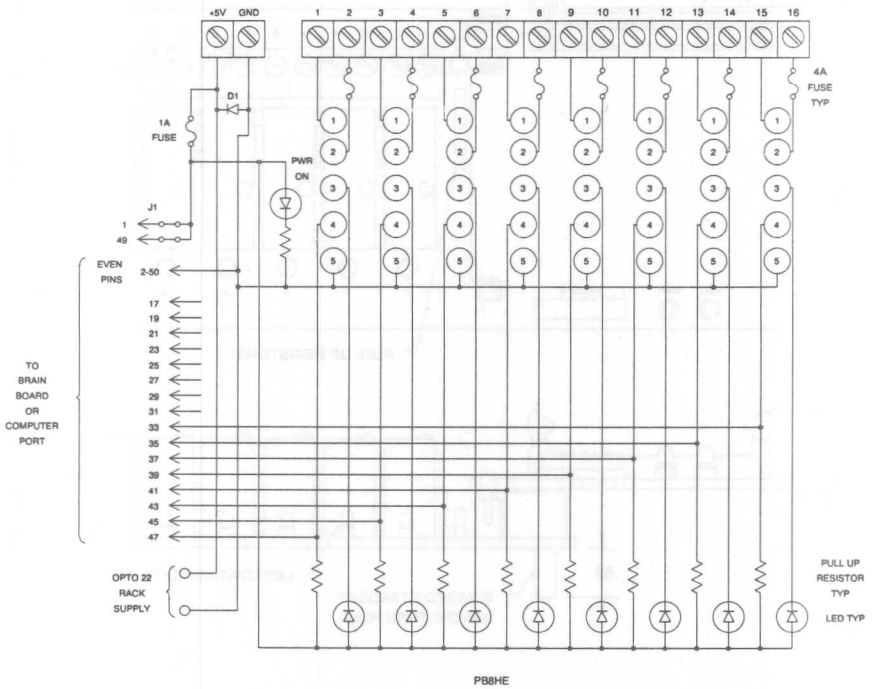
8 POSITION SINGLE CHANNEL I/O MOUNTING RACK

PB8HE

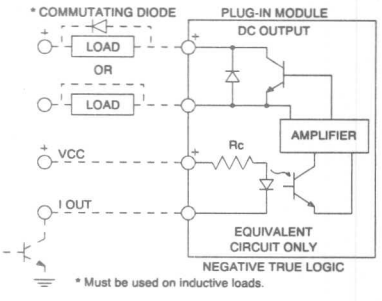
DESCRIPTION

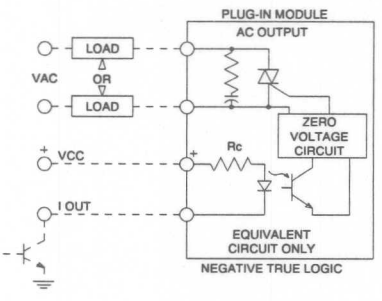
The PB8HE I/O mounting rack can accomodate up to eight single channel I/O modules in any combination. The PB8HE is designed to interface to either OPTOMUX or PAMUX Brain Boards via a 50-pin header connector. This 50-pin header connector also allows an easy connection to computer parallel I/O ports via a 50-conductor ribbon cable. The PB8HE I/O mounting rack uses a VDE approved barrier block and a VDE approved 250 volt plug-in fuse.

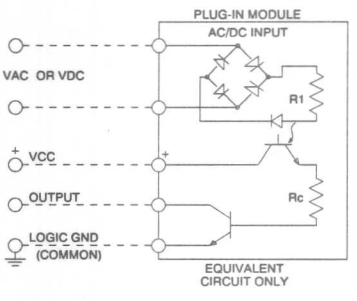
SCHEMATIC



PB8HE







Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

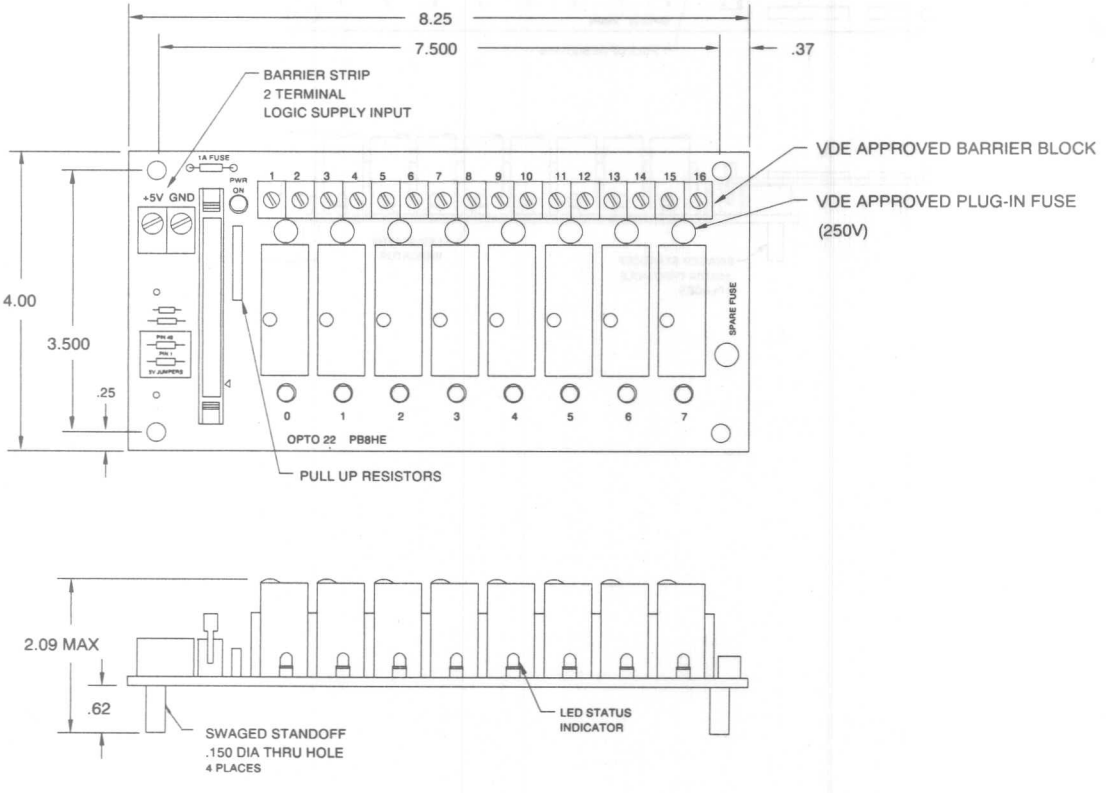
8 POSITION SINGLE CHANNEL I/O MOUNTING RACK

PB8HE

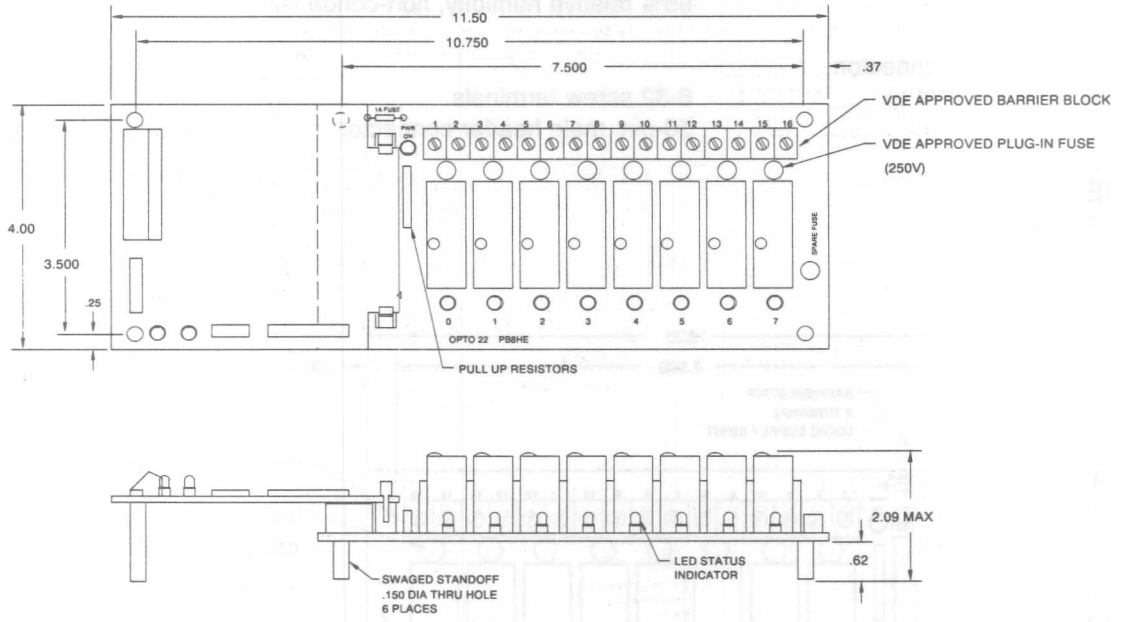
SPECIFICATIONS

Operating Temperature:	0 to 70° C 95% relative humidity, non-condensing
Interface Connector:	
Field	6-32 screw terminals
Logic	50-pin, male header connector

DIMENSIONS

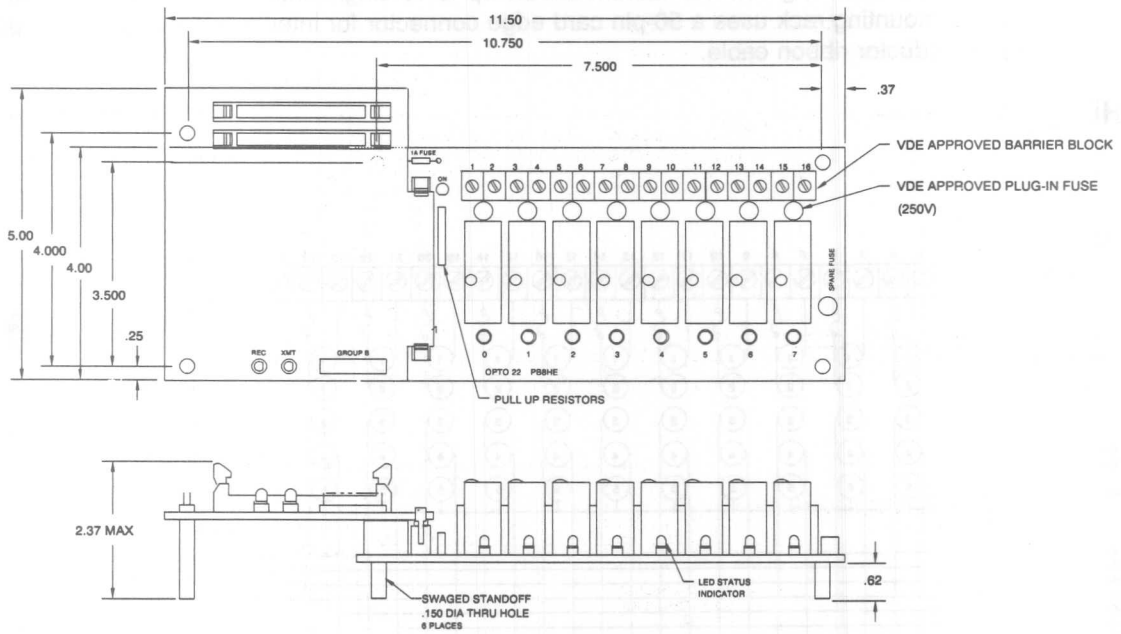


DIMENSIONS WITH OPTOMUX BRAIN BOARD (P/N B1)



Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

DIMENSIONS WITH PAMUX BRAIN BOARD (P/N B5)



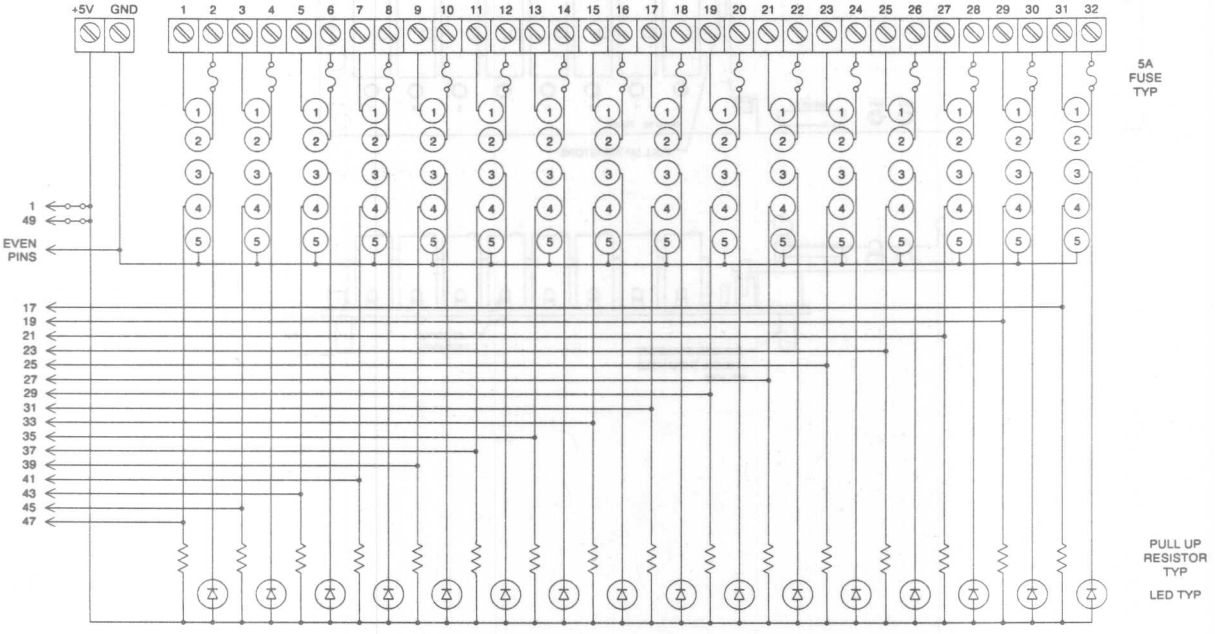
16 POSITION SINGLE CHANNEL I/O MOUNTING RACK

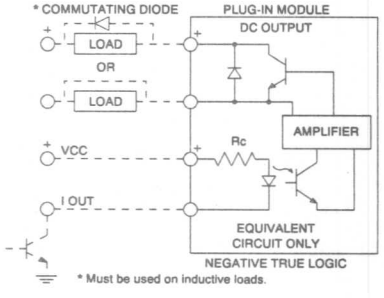
PB16A

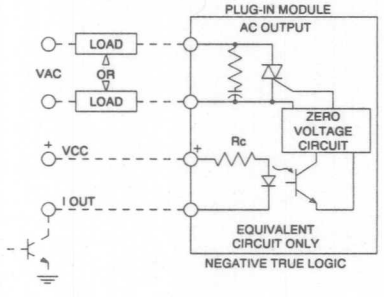
DESCRIPTION

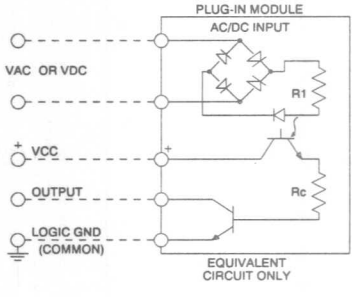
The PB16A I/O mounting rack can accommodate up to 16 single channel I/O modules. The PB16A I/O mounting rack uses a 50-pin card edge connector for interface to computer I/O ports via a 50-conductor ribbon cable.

SCHEMATIC









Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

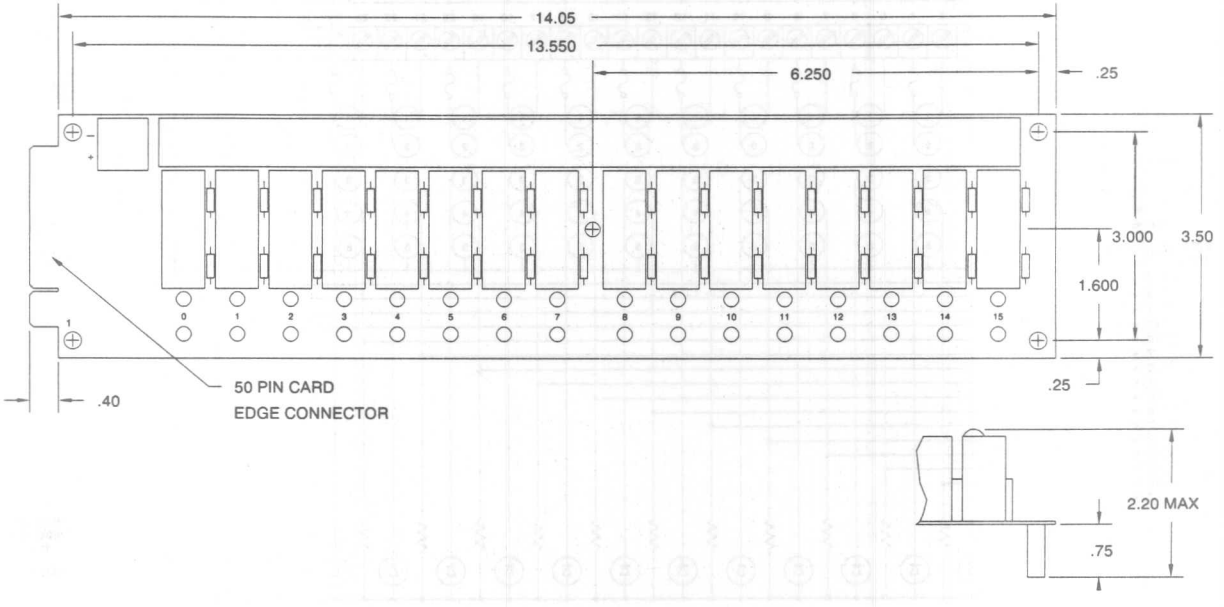
16 POSITION SINGLE CHANNEL I/O MOUNTING RACK

PB16A

SPECIFICATIONS

Operating Temperature:	0 to 70° C 95% relative humidity, non-condensing
Interface Connector:	
Field	6-32 screw terminals
Logic	50-conductor card edge connector

DIMENSIONS



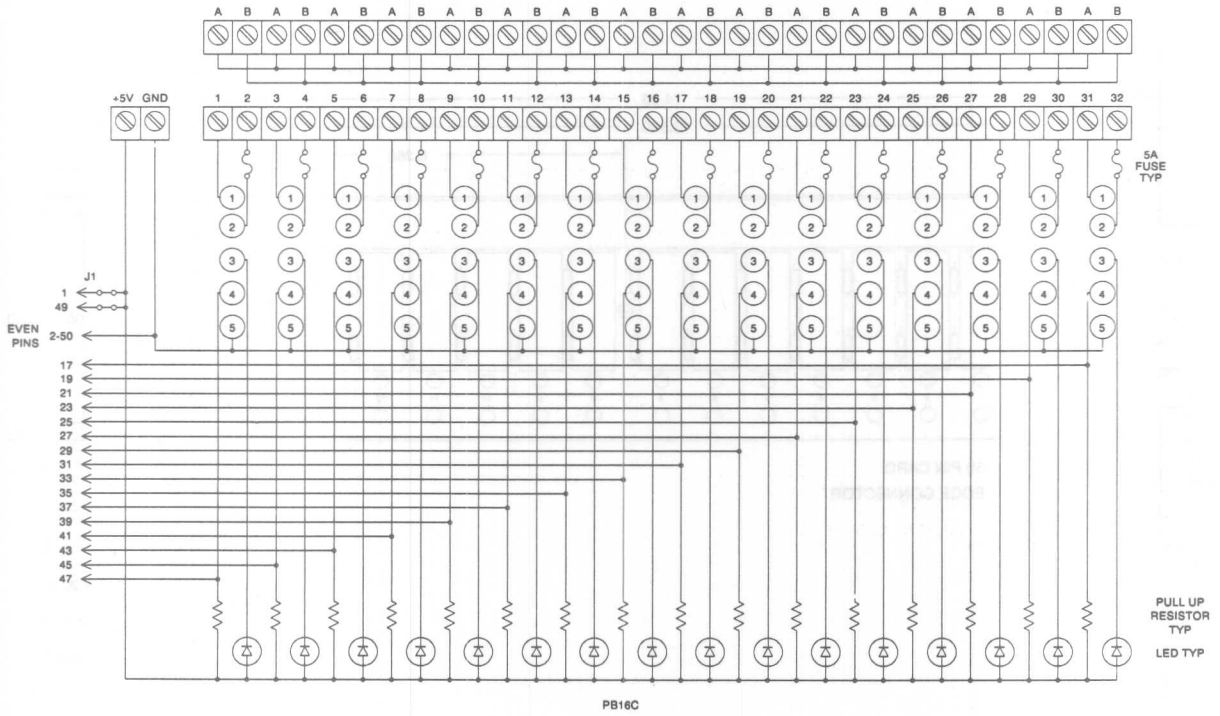
16 POSITION SINGLE CHANNEL I/O MOUNTING RACK

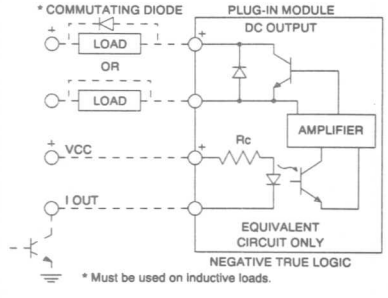
PB16C

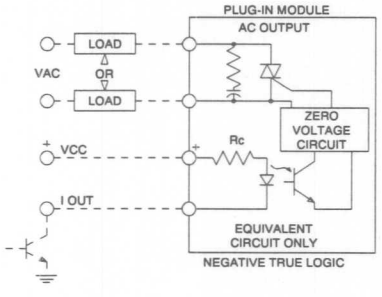
DESCRIPTION

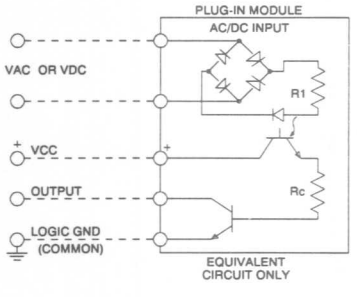
The PB16C I/O mounting rack can accommodate up to 16 single channel I/O modules. This I/O mounting rack is similar to the PB16A but features an extra row of terminals for field connections. The PB16C I/O mounting rack uses a 50-pin card edge connector for interface to computer parallel I/O ports via a 50-conductor ribbon cable.

SCHEMATIC









Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

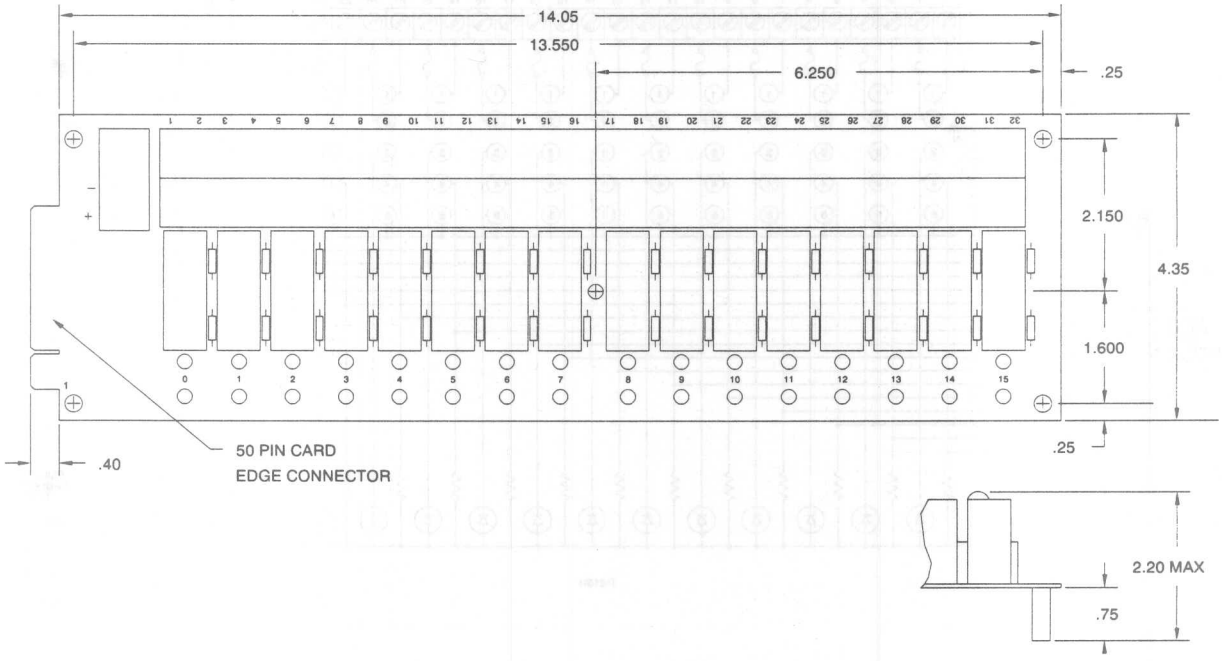
16 POSITION SINGLE CHANNEL I/O MOUNTING RACK

PB16C

SPECIFICATIONS

Operating Temperature:	0 to 70° C 95% relative humidity, non-condensing
Interface Connector:	
Field	6-32 screw terminals
Logic	50-conductor card edge connector

DIMENSIONS



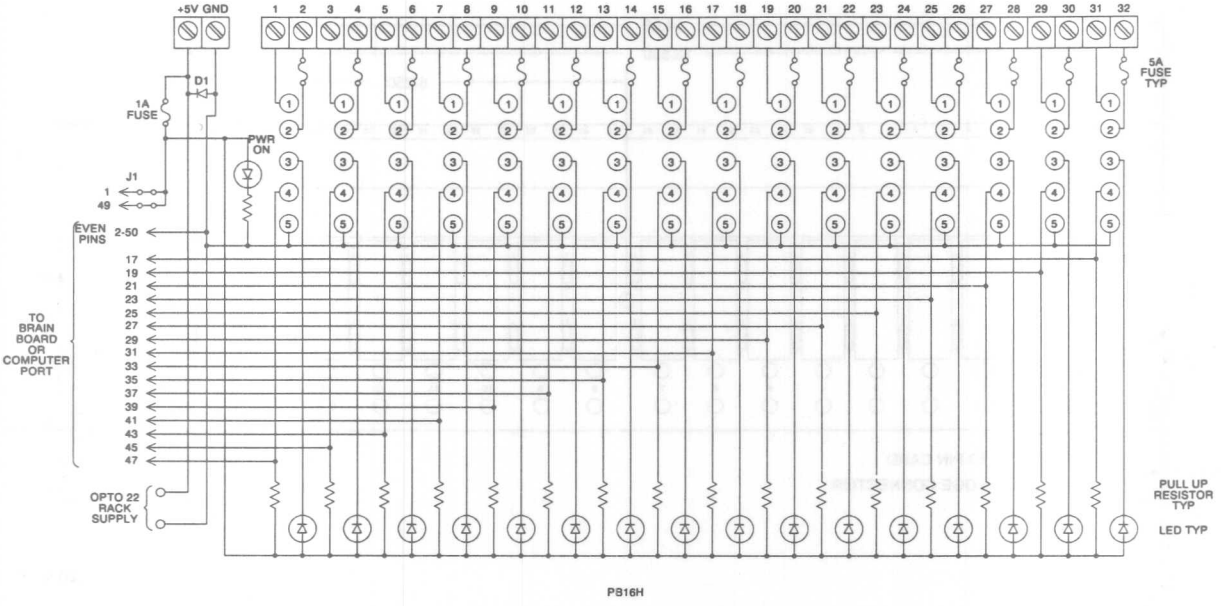
16 POSITION SINGLE CHANNEL I/O MOUNTING RACK

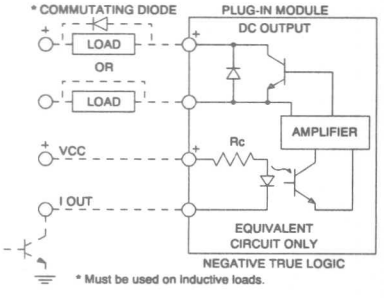
PB16H

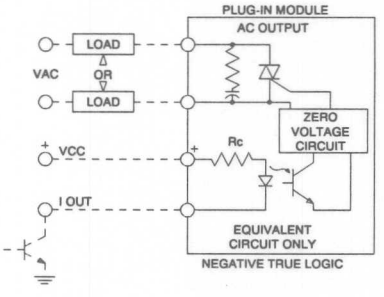
DESCRIPTION

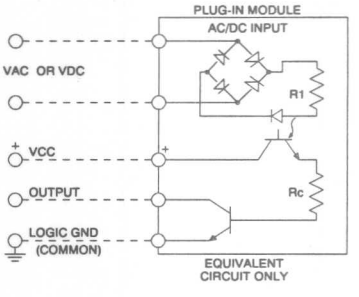
The PB16H I/O mounting rack can accommodate up to 16 single channel I/O modules. The PB16H I/O mounting rack features a 50-pin header connector for easy interface to computer parallel I/O ports via 50-conductor, ribbon cables. The 50-pin connector also allows direct connection to OPTOMUX and PAMUX Brain Boards.

SCHEMATIC









Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

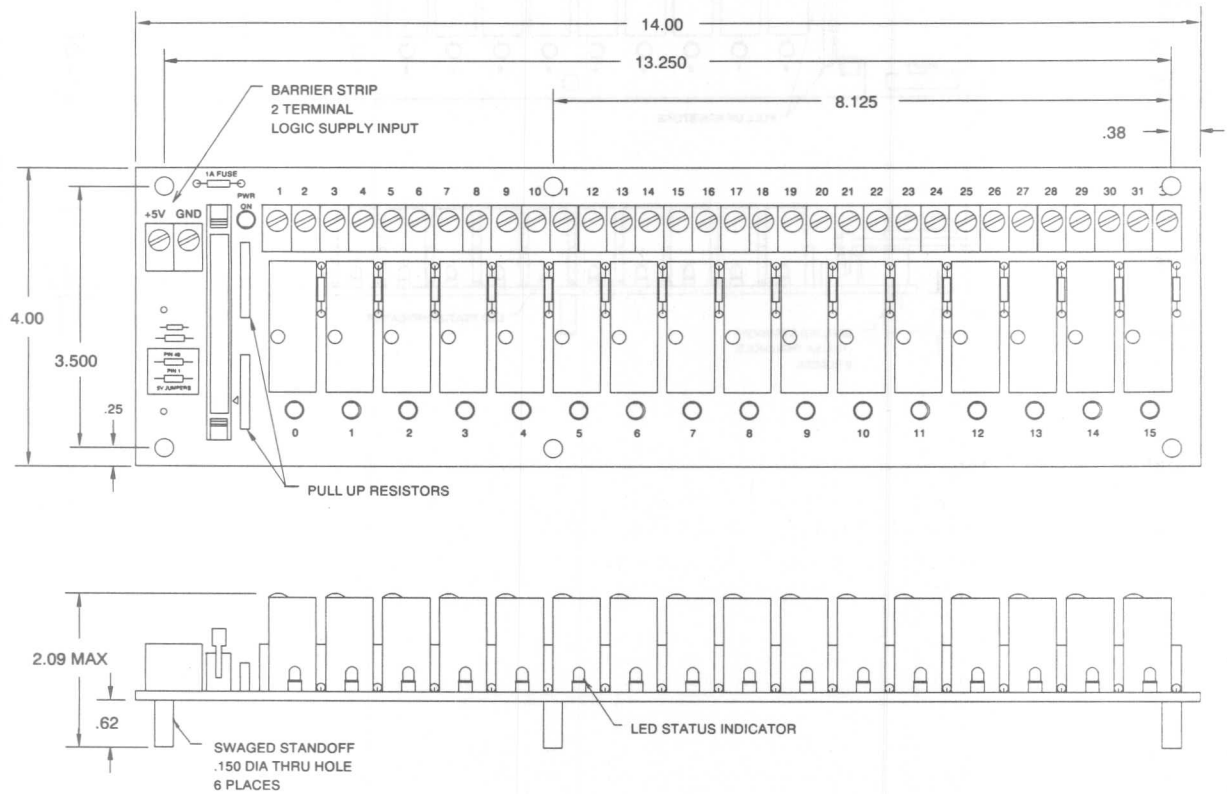
16 POSITION SINGLE CHANNEL I/O MOUNTING RACK

PB16H

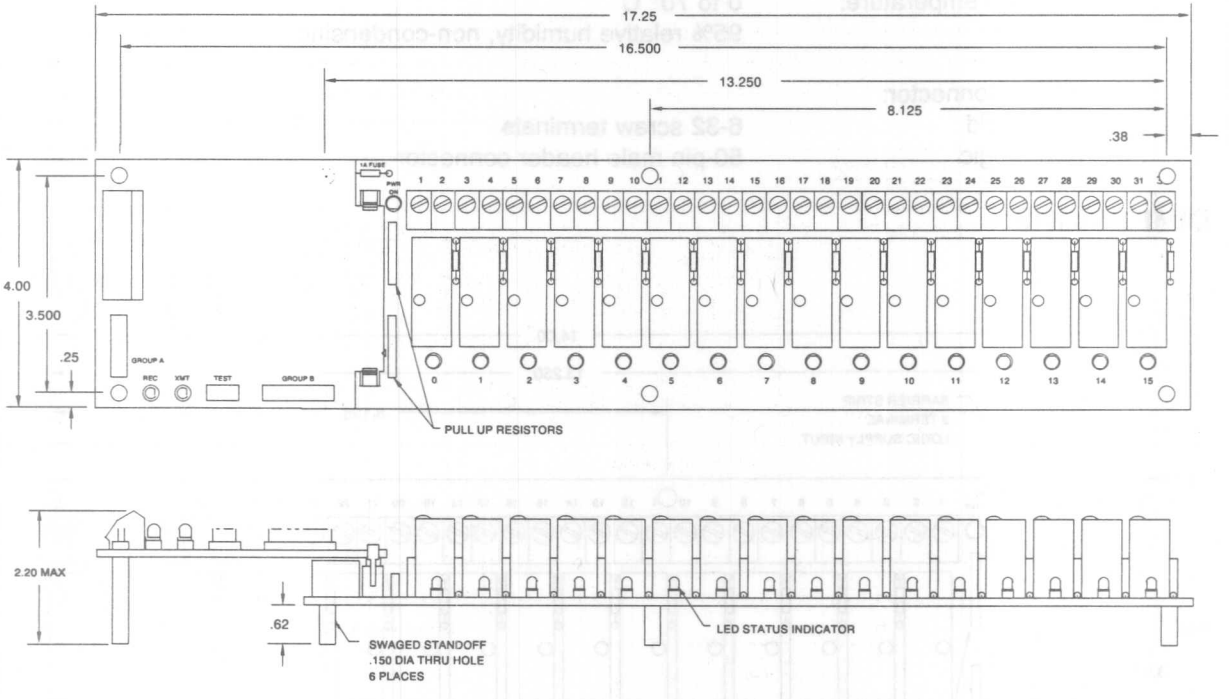
SPECIFICATIONS

Operating Temperature:	0 to 70° C 95% relative humidity, non-condensing
Interface Connector:	
Field	6-32 screw terminals
Logic	50-pin male header connector

DIMENSIONS



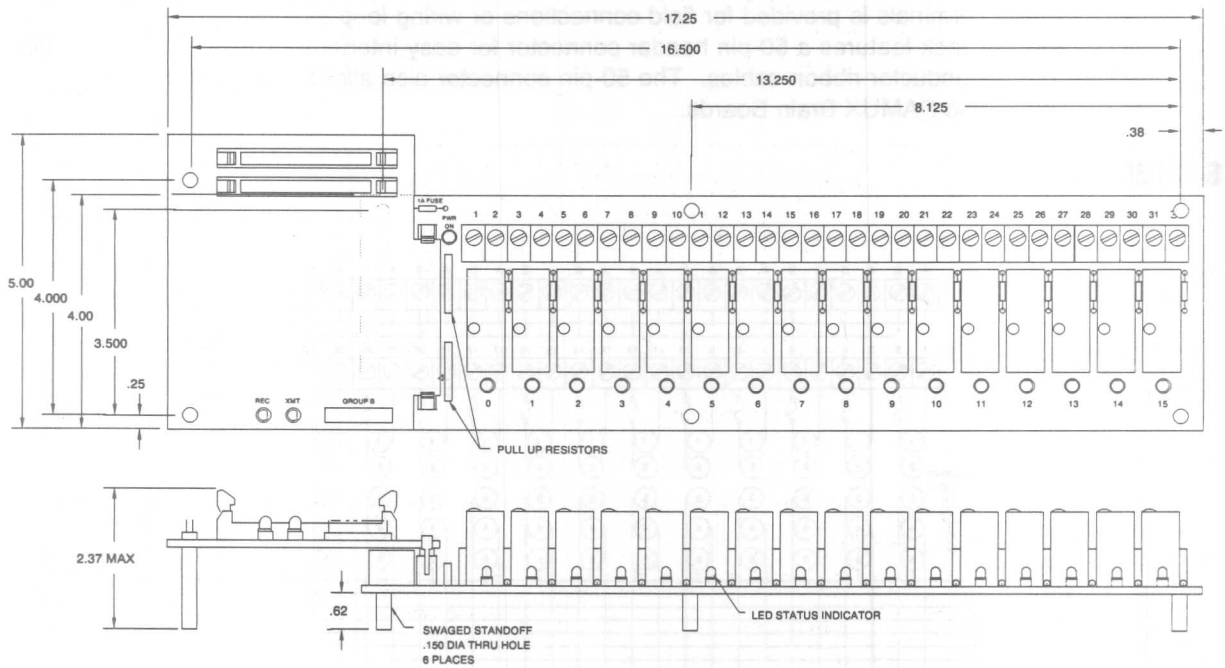
DIMENSIONS WITH OPTOMUX BRAIN BOARD (P/N B1)



16 POSITION SINGLE CHANNEL I/O MOUNTING RACK

PB16H

DIMENSIONS WITH PAMUX BRAIN BOARD (P/N B5)



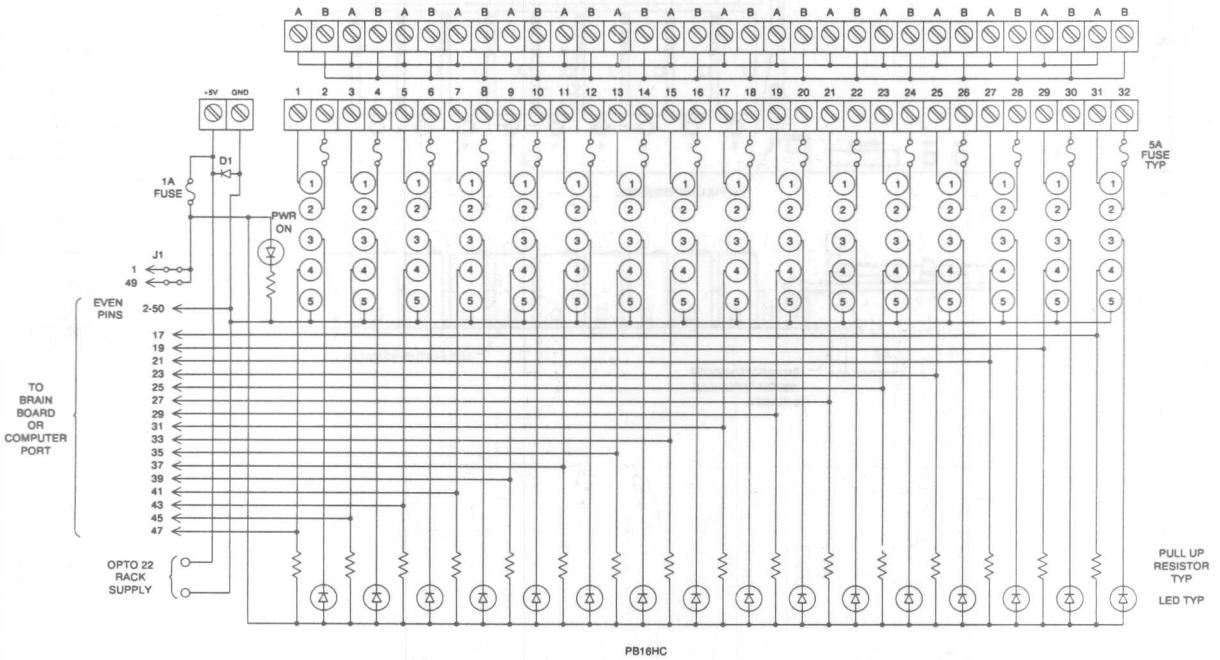
16 POSITION SINGLE CHANNEL I/O MOUNTING RACK

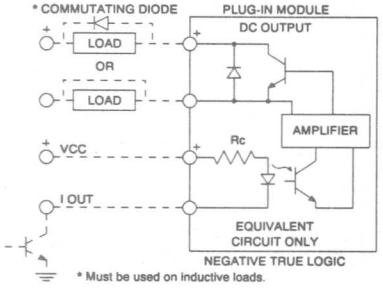
PB16HC

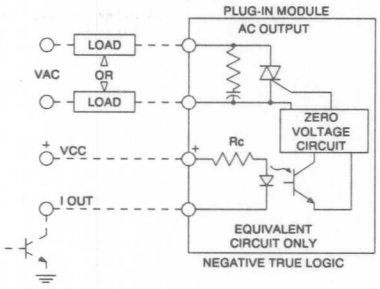
DESCRIPTION

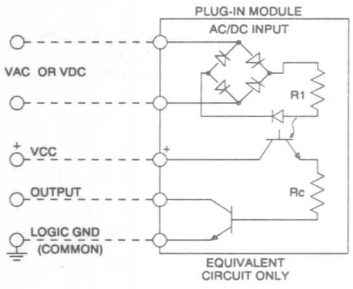
The PB16HC I/O mounting rack can accommodate up to 16 single channel I/O modules. An extra row of terminals is provided for field connections or wiring loop supplies. The PB16HC I/O mounting rack features a 50-pin header connector for easy interface to computer parallel I/O ports via 50-conductor ribbon cables. The 50-pin connector also allows direct connection to OPTOMUX and PAMUX Brain Boards.

SCHEMATIC









Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

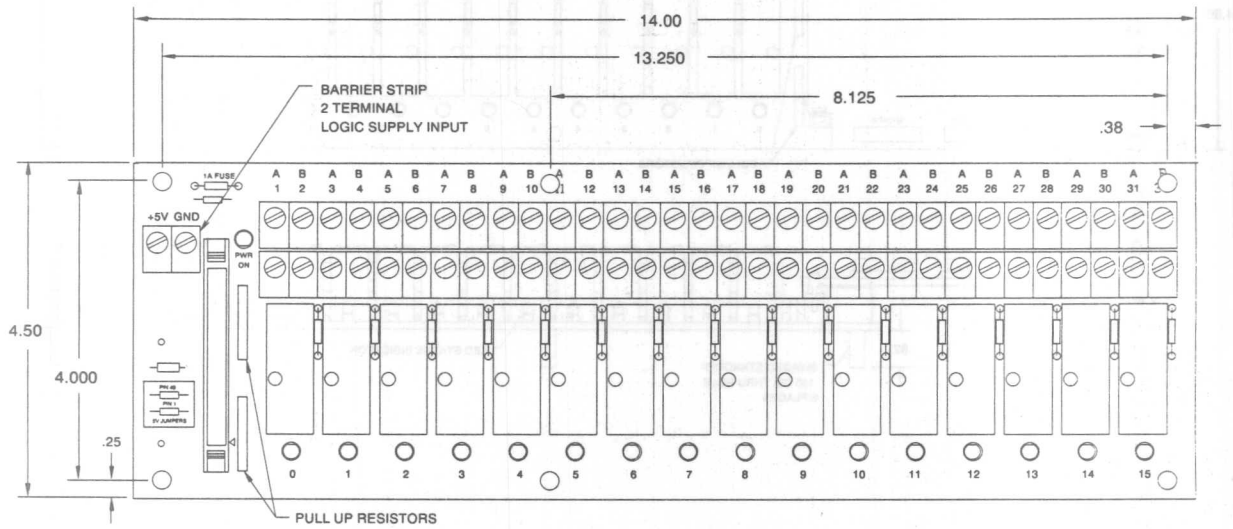
16 POSITION SINGLE CHANNEL I/O MOUNTING RACK

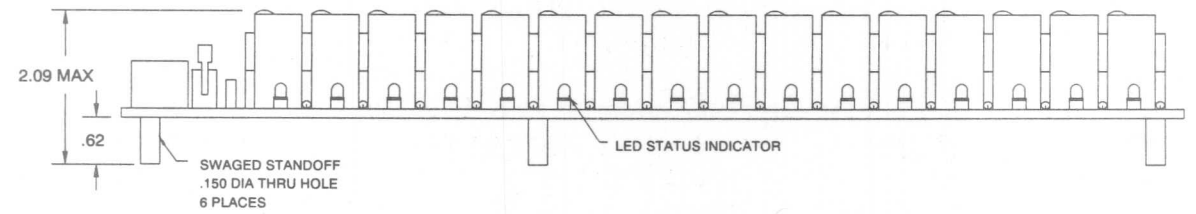
PB16HC

SPECIFICATIONS

Operating Temperature:	0 to 70° C 95% relative humidity, non-condensing
Interface Connector:	
Field	6-32 screw terminals
Logic	50-pin, male header connector

DIMENSIONS

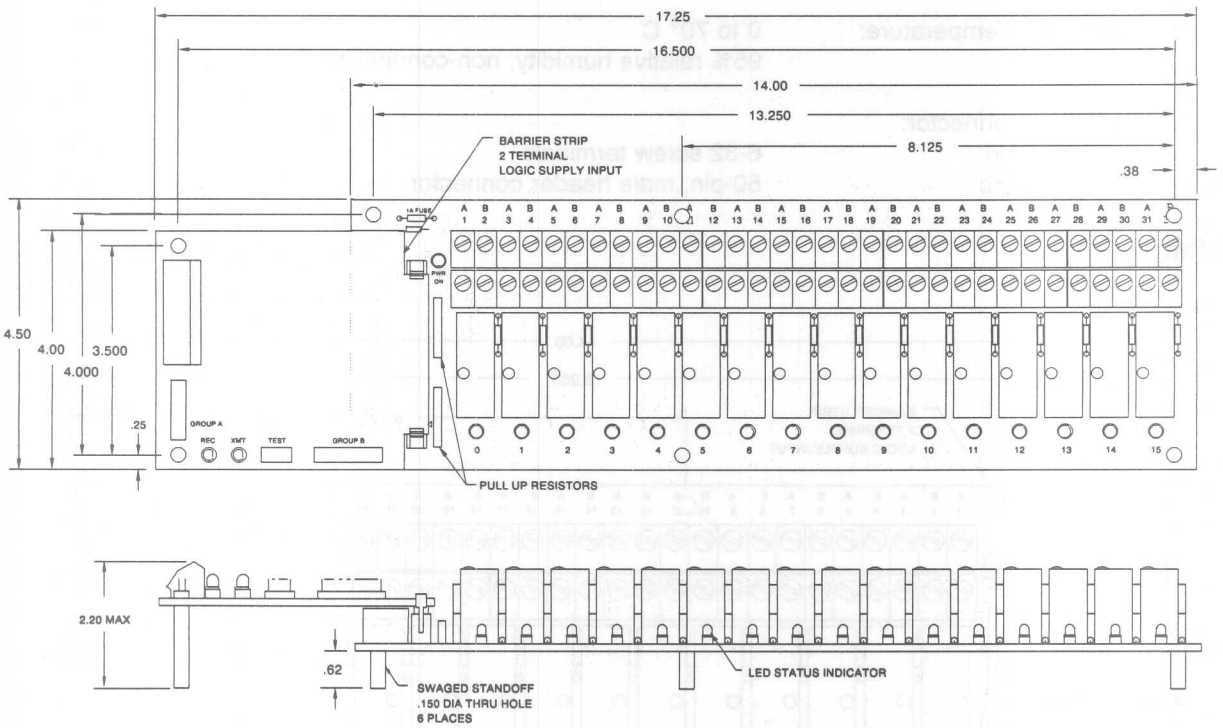




16 POSITION SINGLE CHANNEL I/O MOUNTING RACK

PB16HC

DIMENSIONS WITH OPTOMUX BRAIN BOARD (P/N B1)

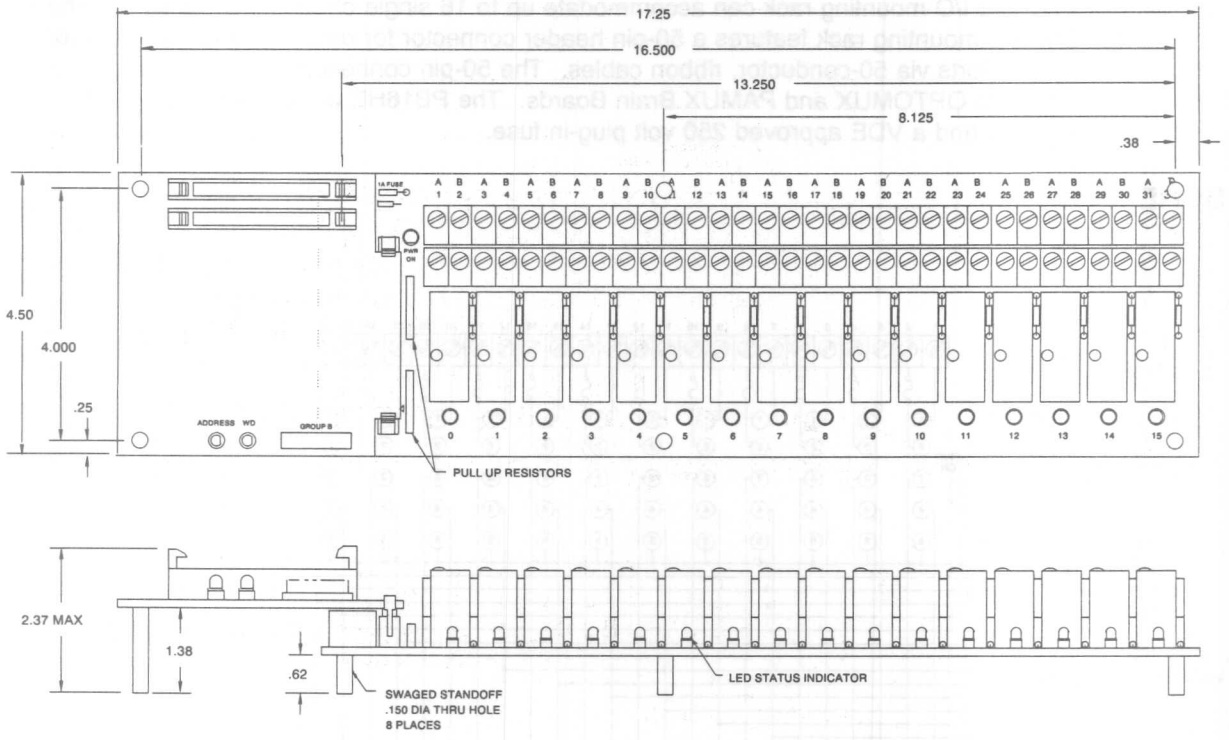


Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

16 POSITION SINGLE CHANNEL I/O MOUNTING RACK

PB16HC

DIMENSIONS WITH PAMUX BRAIN BOARD (P/N B5)



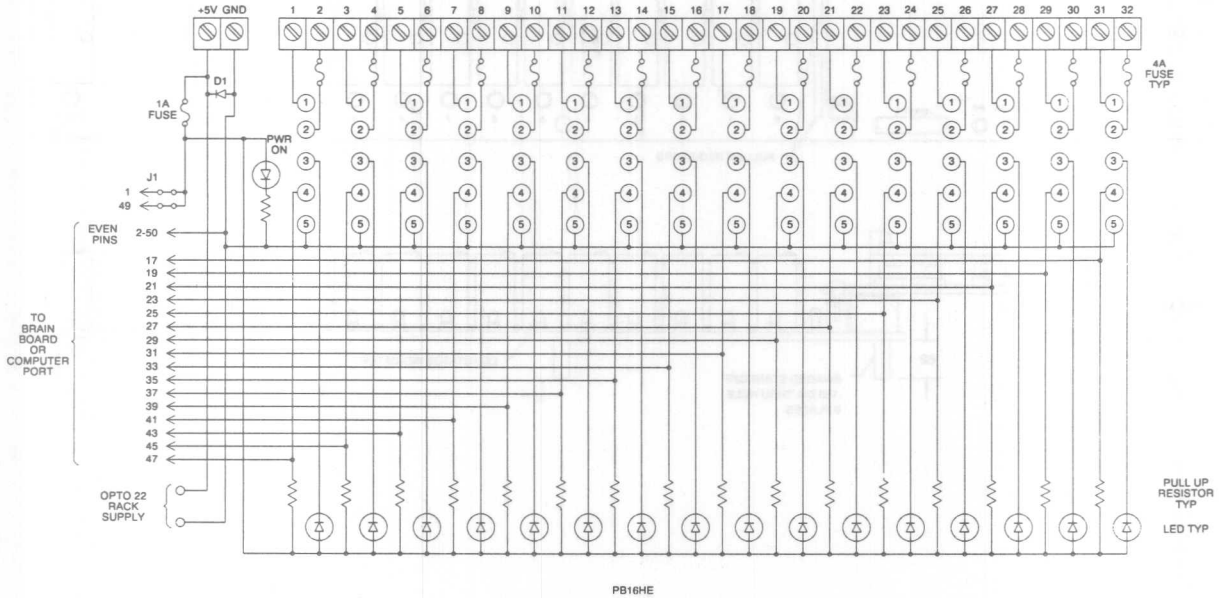
16 POSITION SINGLE CHANNEL I/O MOUNTING RACK

PB16HE

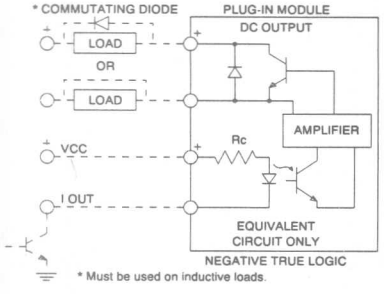
DESCRIPTION

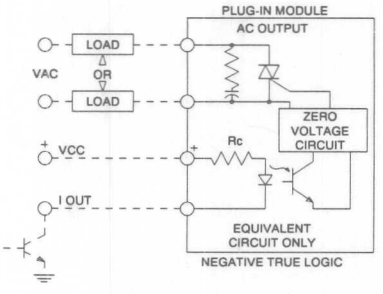
The PB16HE I/O mounting rack can accommodate up to 16 single channel I/O modules. The PB16HE I/O mounting rack features a 50-pin header connector for easy interface to computer parallel I/O ports via 50-conductor, ribbon cables. The 50-pin connector also allows direct connection to OPTOMUX and PAMUX Brain Boards. The PB16HE uses a VDE approved barrier block and a VDE approved 250 volt plug-in fuse.

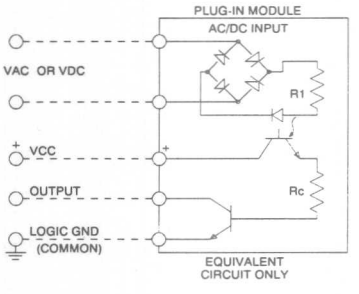
SCHEMATIC



PB16HE







Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

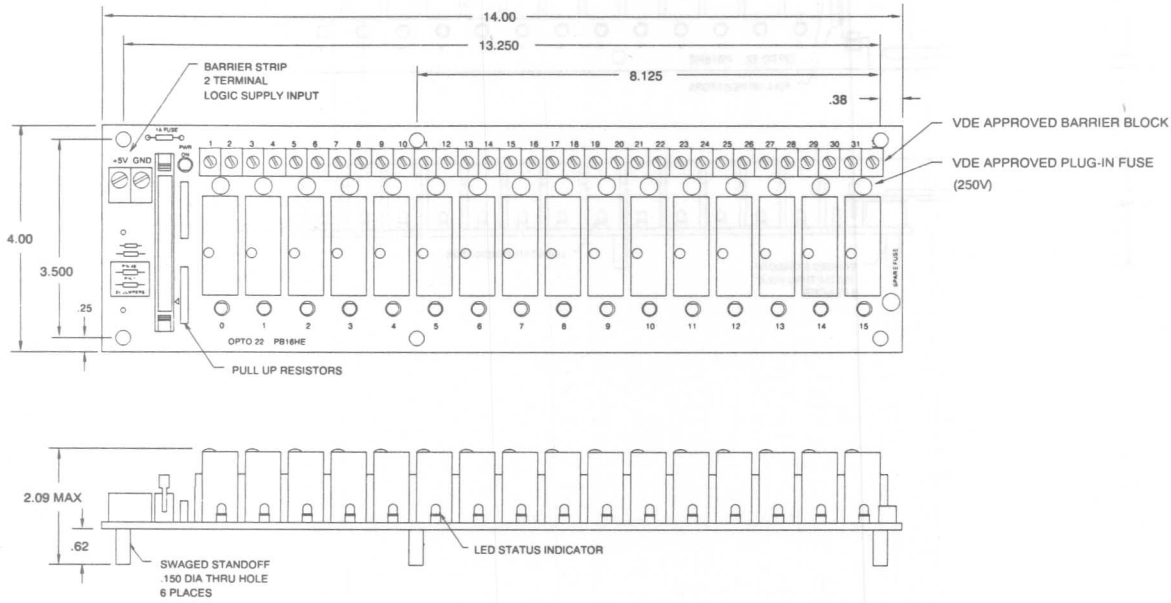
16 POSITION SINGLE CHANNEL I/O MOUNTING RACK

PB16HE

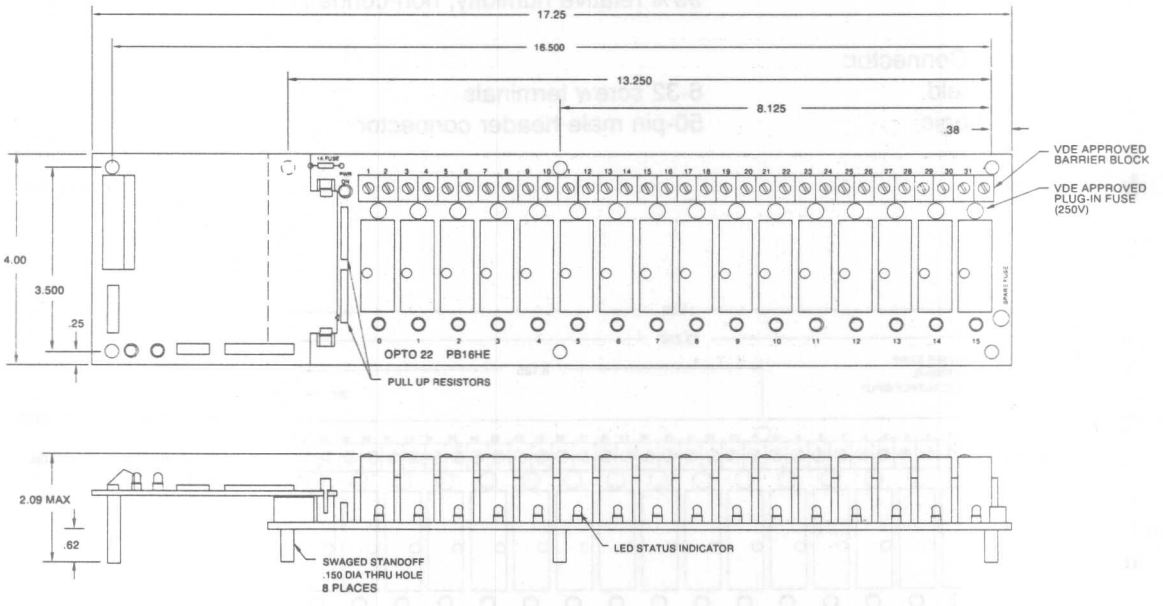
SPECIFICATIONS

Operating Temperature:	0 to 70° C 95% relative humidity, non-condensing
Interface Connector:	
Field	6-32 screw terminals
Logic	50-pin male header connector

DIMENSIONS



DIMENSIONS WITH OPTOMUX BRAIN BOARD (P/N B1)

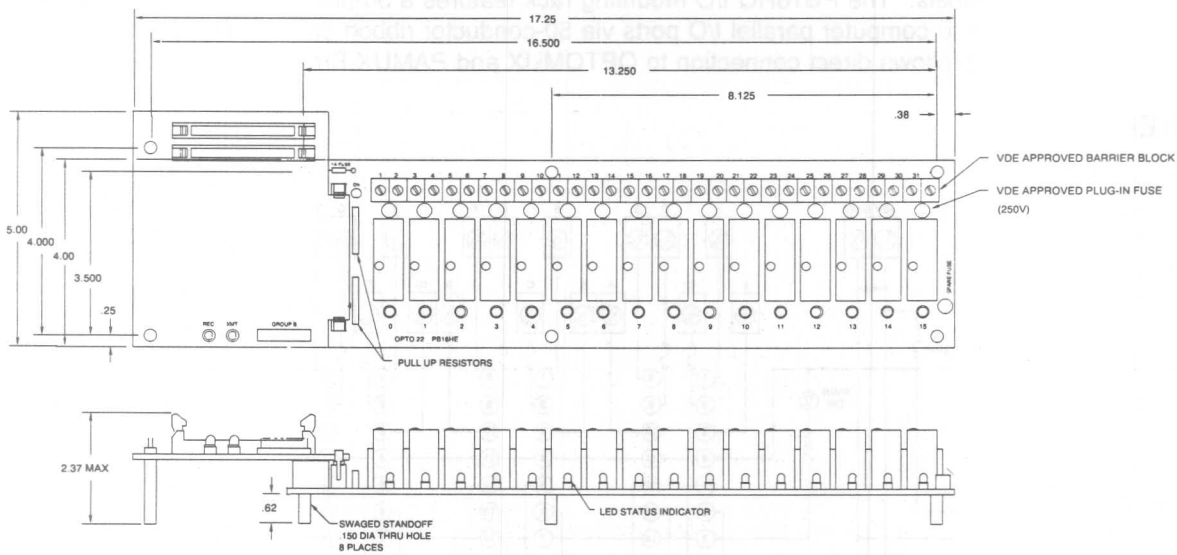


Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

16 POSITION SINGLE CHANNEL I/O MOUNTING RACK

PB16HE

DIMENSIONS WITH PAMUX BRAIN BOARD (P/N B5)



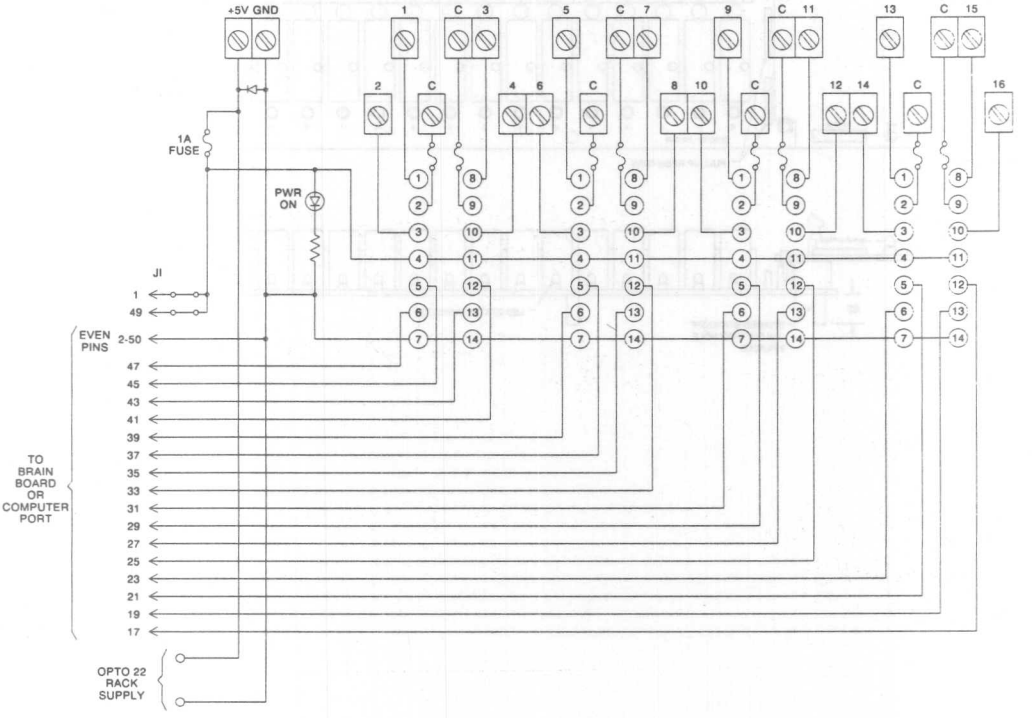
16 CHANNEL QUAD PAK I/O MOUNTING RACK

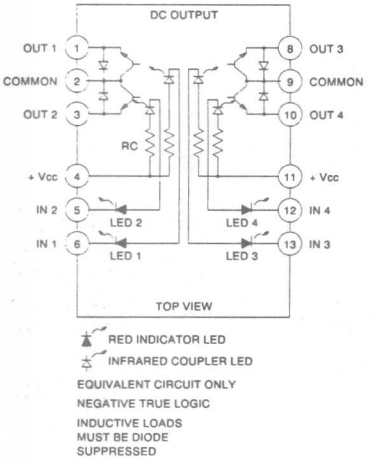
PB16HQ

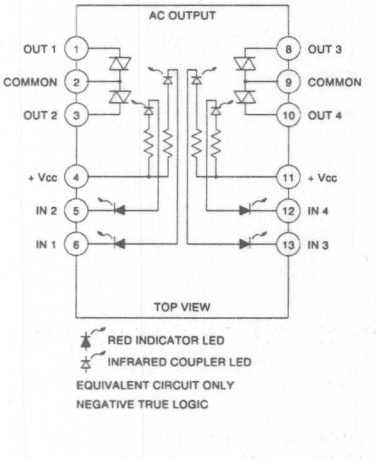
DESCRIPTION

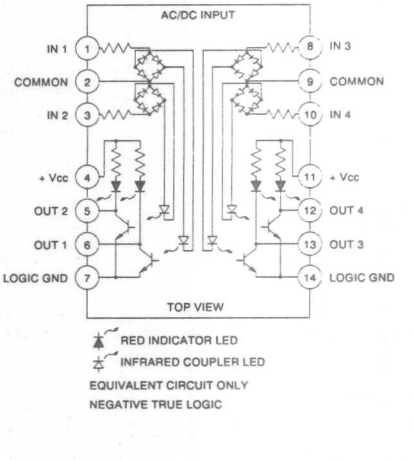
The PB16HQ I/O mounting rack can accommodate up to four Quad Pak I/O modules for a total of 16 I/O channels. The PB16HQ I/O mounting rack features a 50-pin header connector for easy interface to computer parallel I/O ports via 50-conductor ribbon cables. The 50-pin connector also allows direct connection to OPTOMUX and PAMUX Brain Boards.

SCHEMATIC









Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

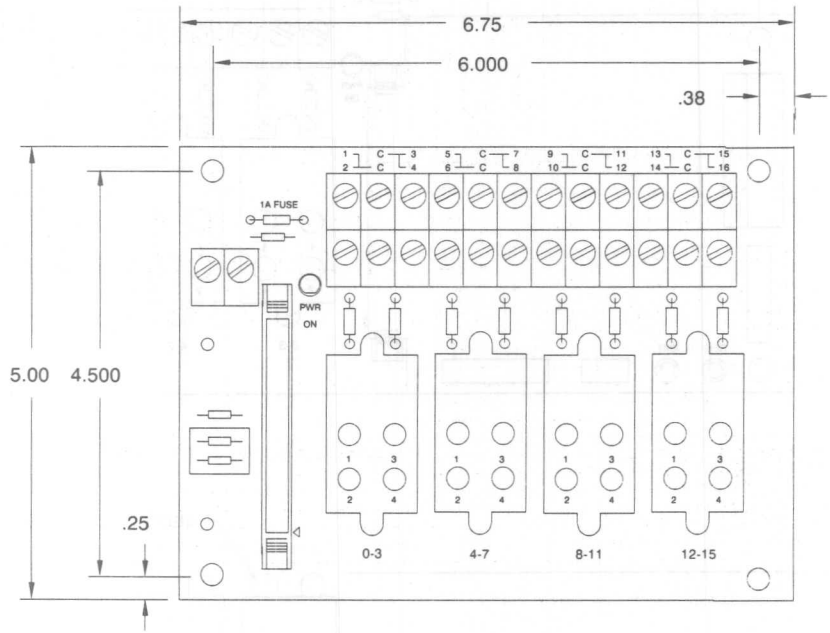
16 CHANNEL QUAD PAK I/O MOUNTING RACK

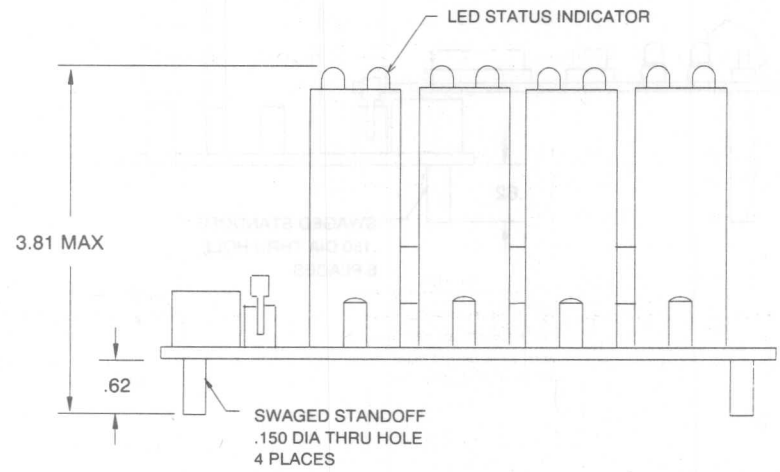
PB16HQ

SPECIFICATIONS

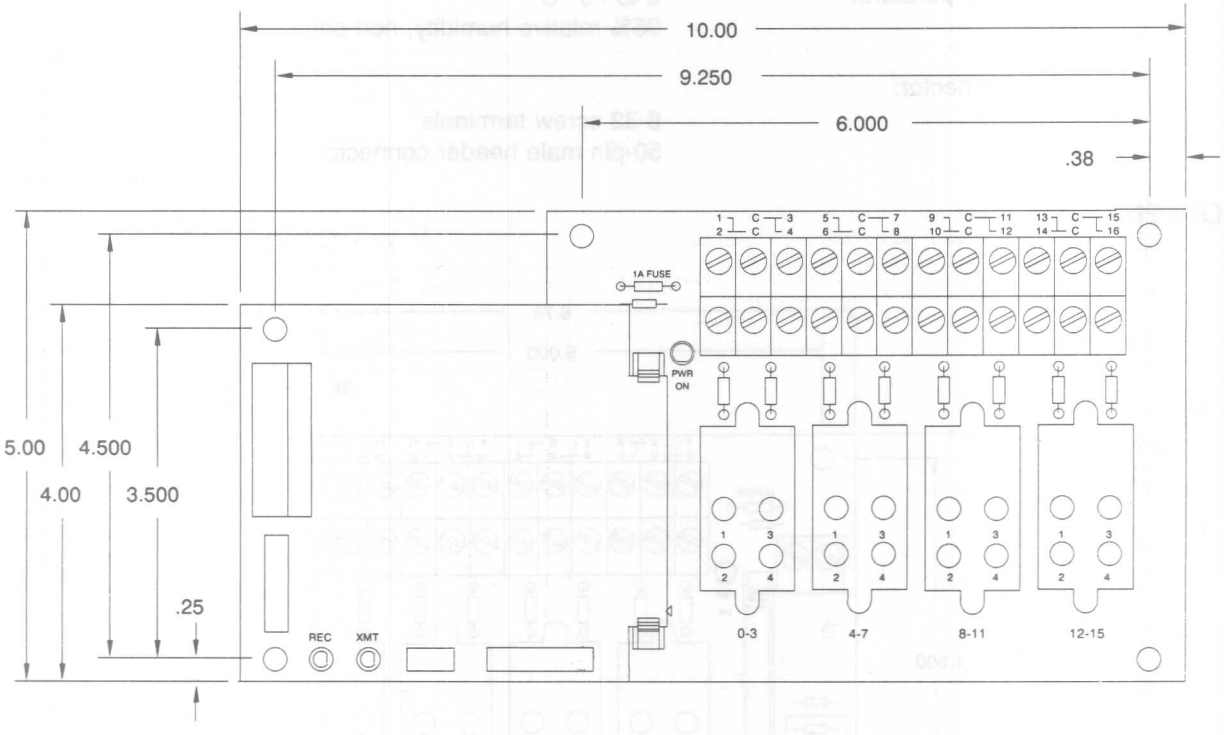
Operating Temperature:	0 to 70° C 95% relative humidity, non-condensing
Interface Connector:	
Field	6-32 screw terminals
Logic	50-pin male header connector

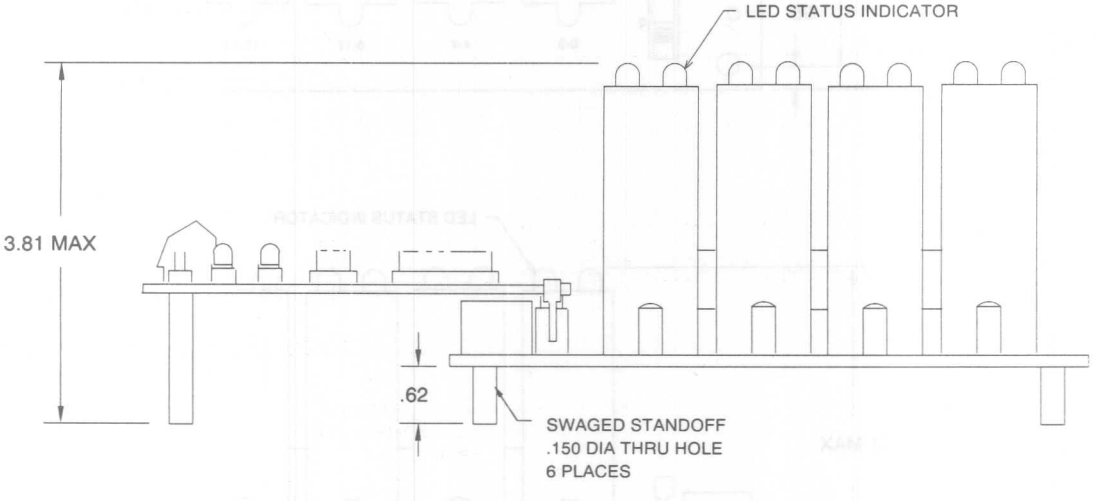
DIMENSIONS





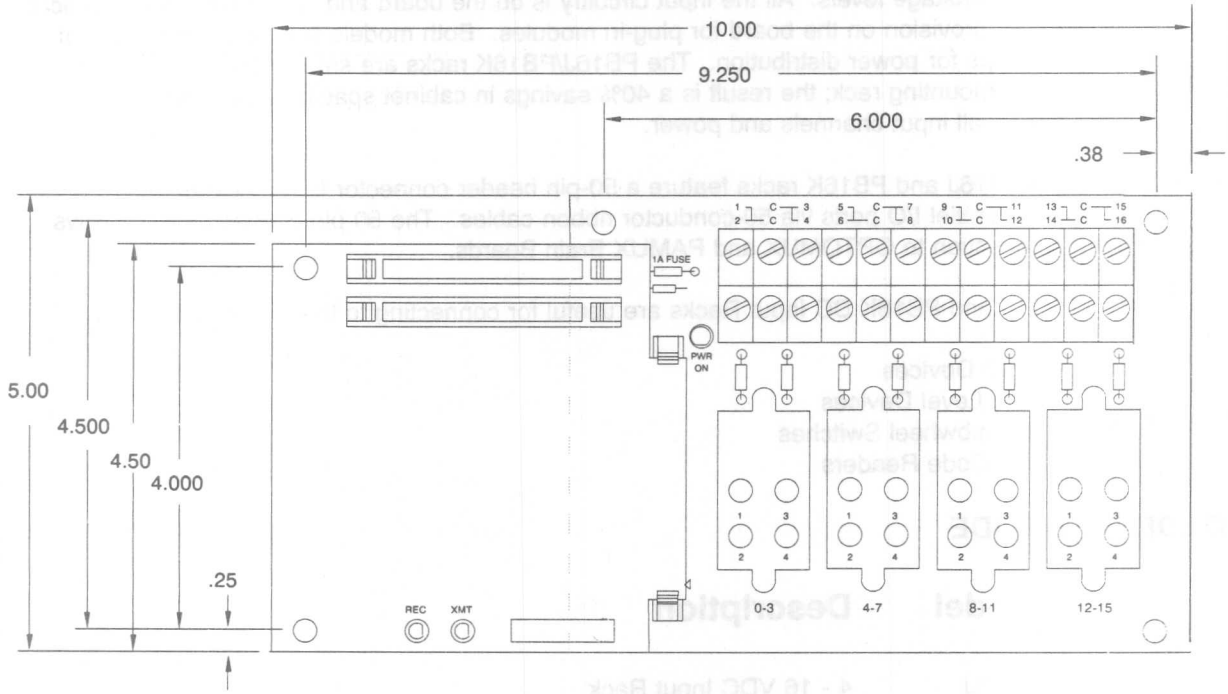
DIMENSIONS WITH OPTOMUX BRAIN BOARD (P/N B1)

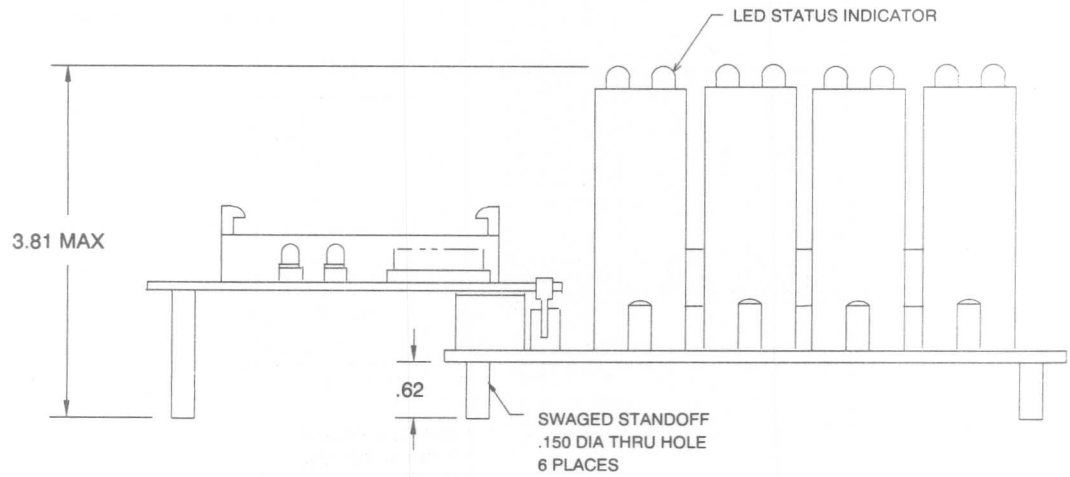




Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

DIMENSIONS WITH PAMUX BRAIN BOARD (P/N B5)





16 POSITION INTEGRAL DC INPUT CHANNEL RACK

4 - 16 VDC **PB16J**
16 - 28 VDC **PB16K**

DESCRIPTION

The PB16J/PB16K DC Input Racks provide 16 channels of optically isolated inputs for sensing ON/OFF DC voltage levels. All the input circuitry is on the board and all channels are identical. There is no provision on the board for plug-in modules. Both models feature an extra row of terminal strips for power distribution. The PB16J/PB16K racks are smaller than a standard PB16H I/O mounting rack; the result is a 40% savings in cabinet space. Indicators are provided for all input channels and power.

Both the PB16J and PB16K racks feature a 50-pin header connector for easy interface to computer parallel I/O ports via 50-conductor ribbon cables. The 50-pin connector also allows direct connection to OPTOMUX and PAMUX Brain Boards.

The PB16J and PB16K DC Input Racks are useful for connecting to the following devices:

BCD Devices
TTL Level Devices
Thumbwheel Switches
Bar Code Readers

ORDERING GUIDE

Model	Description
PB16J	4 - 16 VDC Input Rack
PB16K	16 - 28 VDC Input Rack

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

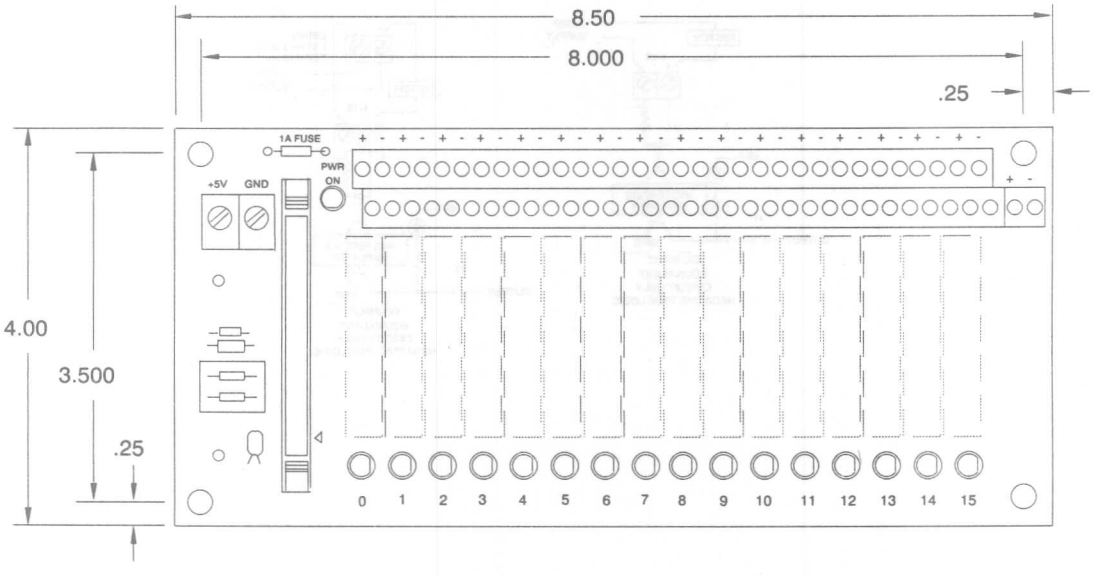
16 POSITION INTEGRAL DC INPUT CHANNEL RACK

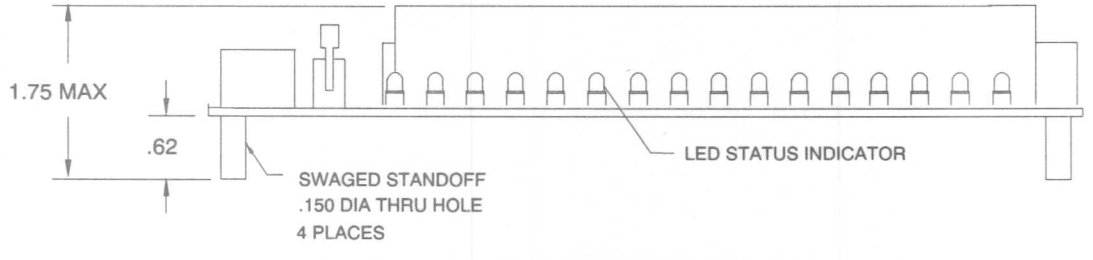
4 - 16 VDC **PB16J**
16 - 28 VDC **PB16K**

SPECIFICATIONS

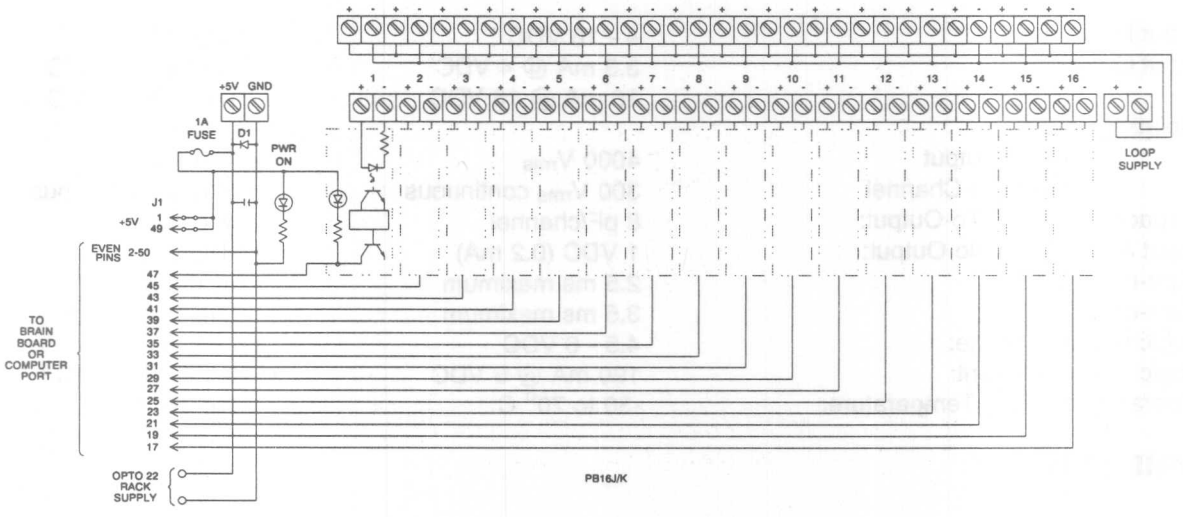
	PB16J	PB16K
Input Line Voltage:	4 - 16 VDC	16 - 28 VDC
Input Current:	3.3 mA @ 4 VDC 16 mA @ 16 VDC	3.4 mA @ 16 VDC 6.3 mA @ 28 VDC
Isolation:		
Input-To-Output	4000 V_{rms}	4000 V_{rms}
Channel-To-Channel	300 V_{rms} continuous	300 V_{rms} continuous
Capacitance Input-To-Output:	8 pF/channel	8 pF/channel
Input Allowed For No Output:	1 VDC (0.2 mA)	1 VDC (0.2 mA)
Turn-on Time:	2.5 ms maximum	3 ms maximum
Turn-off Time:	3.5 ms maximum	4.5 ms maximum
Logic Supply Voltage:	4.5 - 6 VDC	4.5 - 6 VDC
Logic Supply Current:	190 mA @ 5 VDC	190 mA @ 5 VDC
Operating Ambient Temperature:	-30 to 70° C	-30 to 70° C

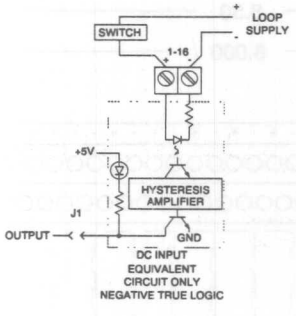
DIMENSIONS

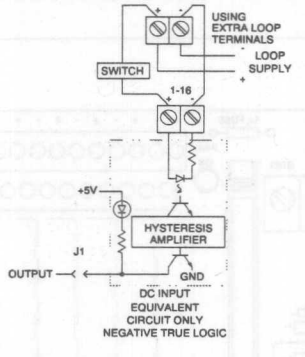




SCHEMATIC

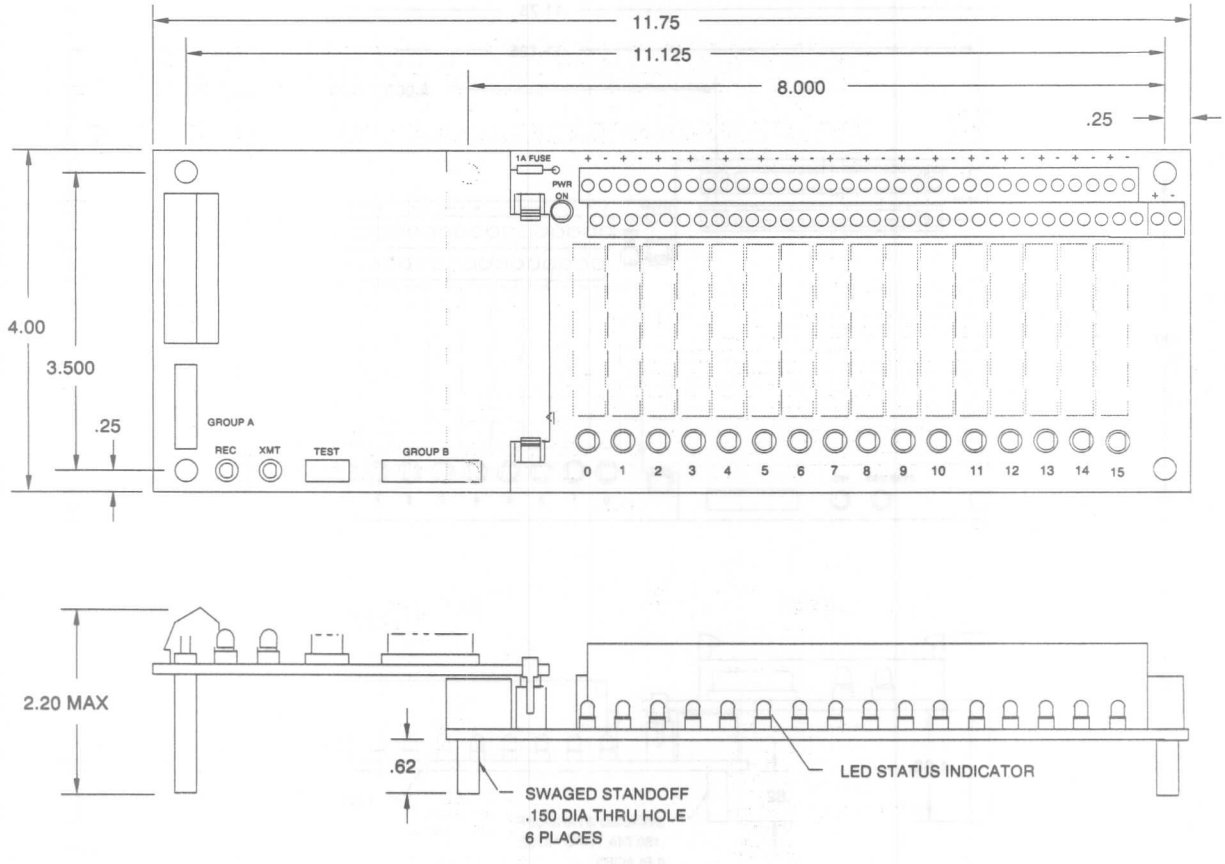




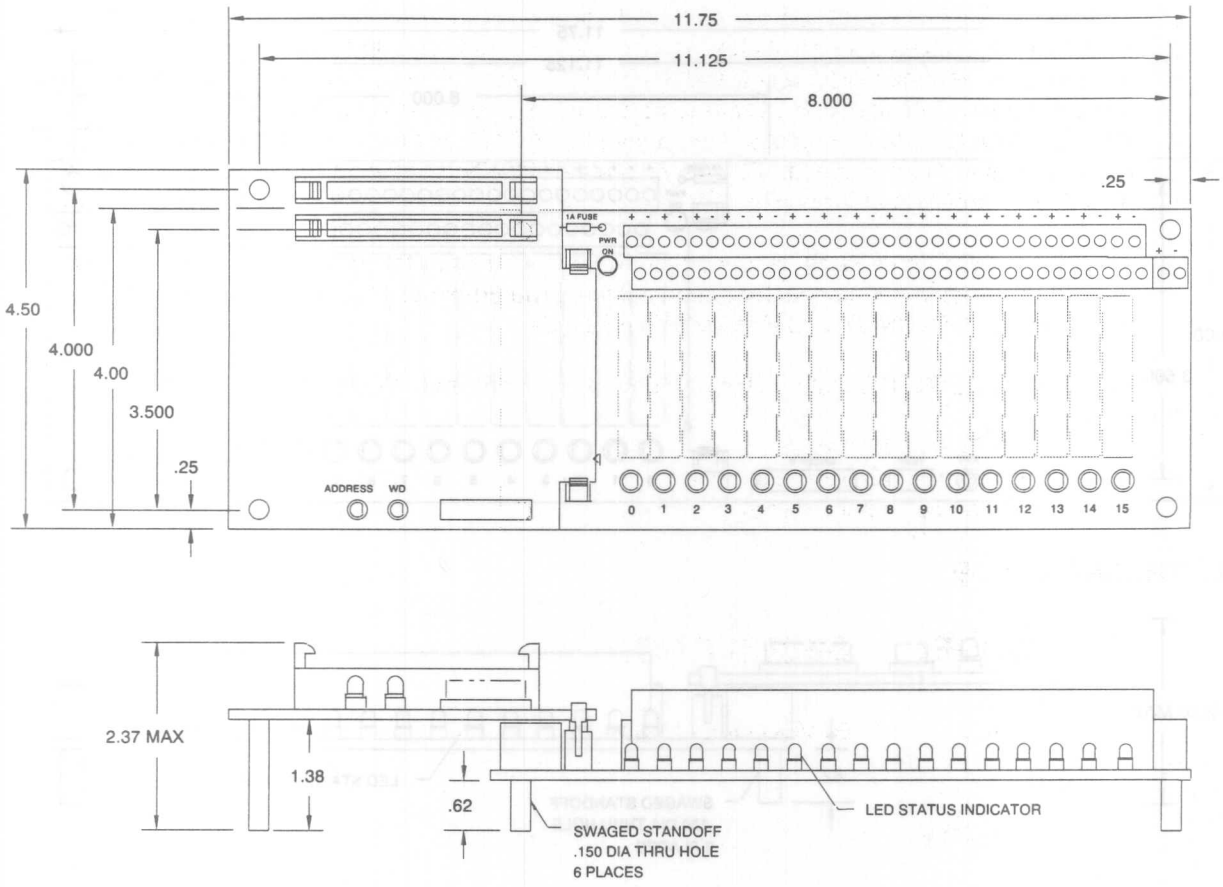


Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

DIMENSIONS WITH OPTOMUX BRAIN BOARD (P/N B1)



DIMENSIONS WITH PAMUX BRAIN BOARD (P/N B5)



Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

16 POSITION INTEGRAL DC OUTPUT CHANNEL RACK — 60 VDC — PB16L

DESCRIPTION

The PB16L DC Output Rack provides 16 individual channels of optically isolated output for controlling or switching small DC loads. Each channel provides up to 4000 V_{rms} of optical isolation between the field devices and the control logic. All the output circuitry is on the board and all channels are identical. There is no provision on the board for plug-in modules. The PB16L DC Output Rack is smaller than a standard PB16H I/O mounting rack; the result is a 40% savings in cabinet space. All outputs are individually fused and indicators are provided for all output channels and for power.

The PB16L DC Output Rack uses a 50-pin, header connector for easy interface to computer parallel I/O ports via 50-conductor ribbon cables. The 50-pin connector also allows direct connection to OPTOMUX and PAMUX Brain Boards.

Uses for the PB16L DC Output Rack include, but are not limited to, controlling the following:

Low Power DC Relays
Low Power DC Solenoids
DC Lamps And Indicators

ORDERING GUIDE

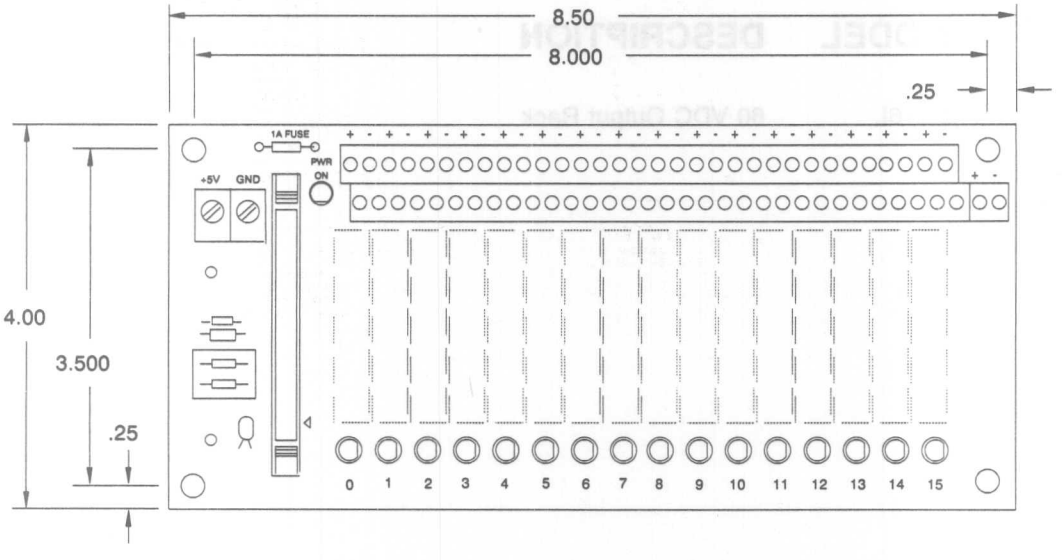
MODEL	DESCRIPTION
PB16L	60 VDC Output Rack

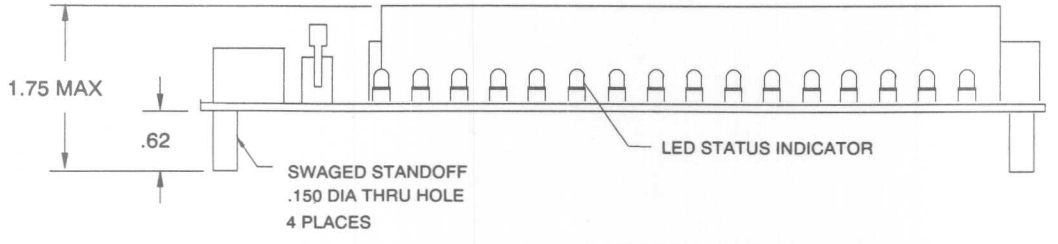
16 POSITION INTEGRAL DC OUTPUT CHANNEL RACK — 60 VDC — PB16L

SPECIFICATIONS

	PB16L
Load Voltage Rating:	5 - 60 VDC
Output Current Rating:	0.5 amperes @ 45° C
	0.2 amperes @ 70° C
One Second Surge:	1.3 amperes
Output Voltage Drop:	1.6 VDC maximum
Off-state Leakage @ Maximum Voltage:	1 mA maximum
Isolation:	
Input-To-Output	4000 V_{rms}
Channel-To-Channel	300 V_{rms} continuous
Turn-on Time:	100 microseconds
Turn-off Time:	100 microseconds
Logic Supply Voltage Range:	4.5 to 6.0 VDC
Logic Supply Current:	190 mA @ 5 VDC
Operating Ambient Temperature:	-30 to 70° C

DIMENSIONS

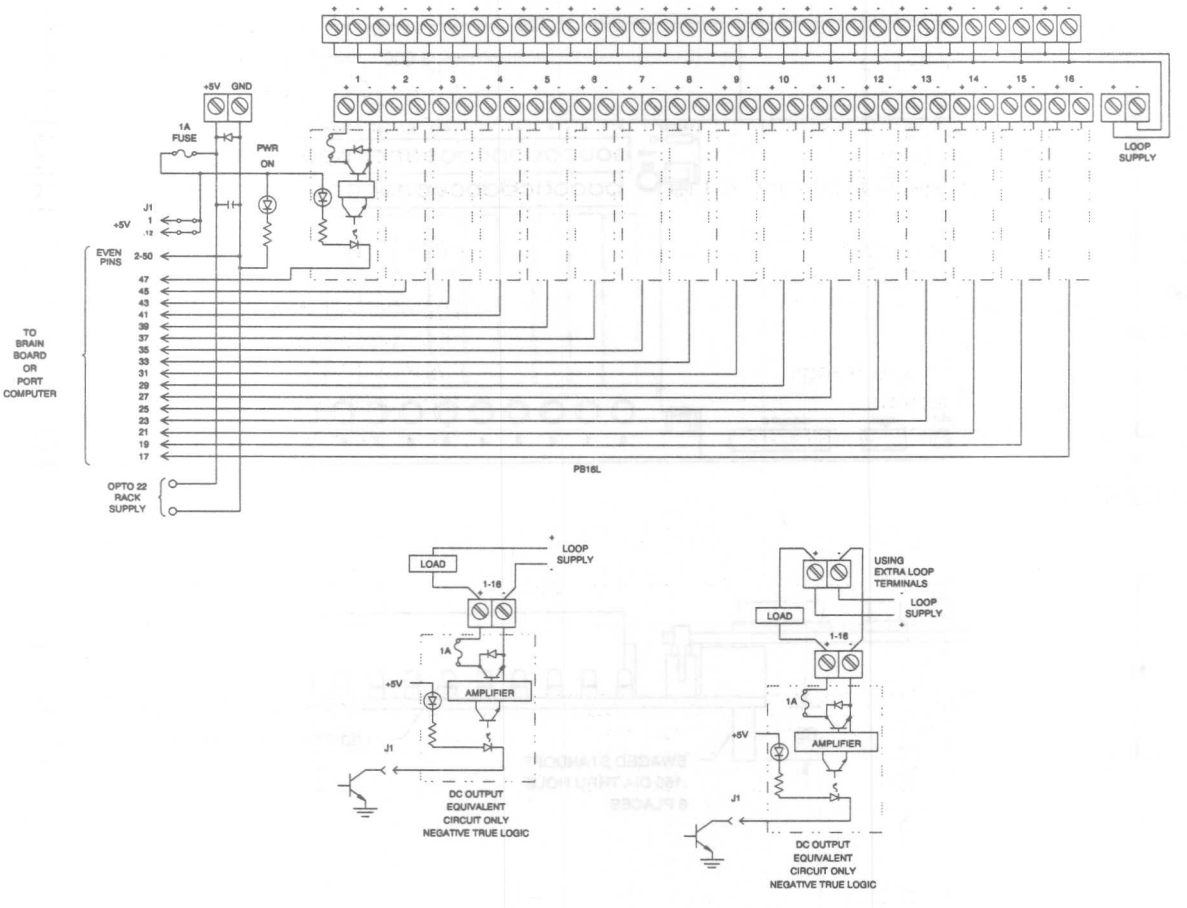




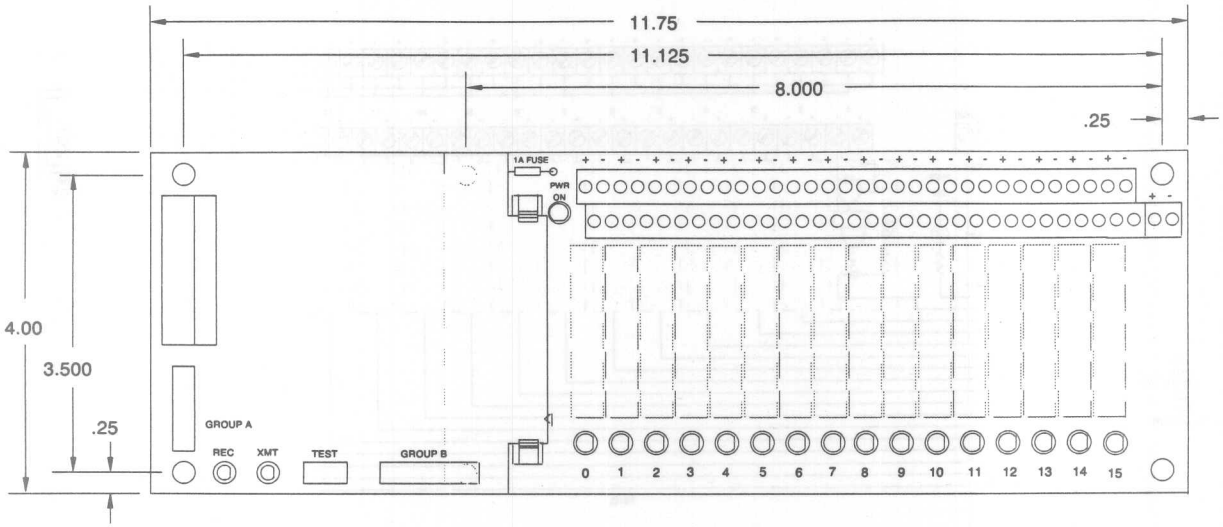
Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

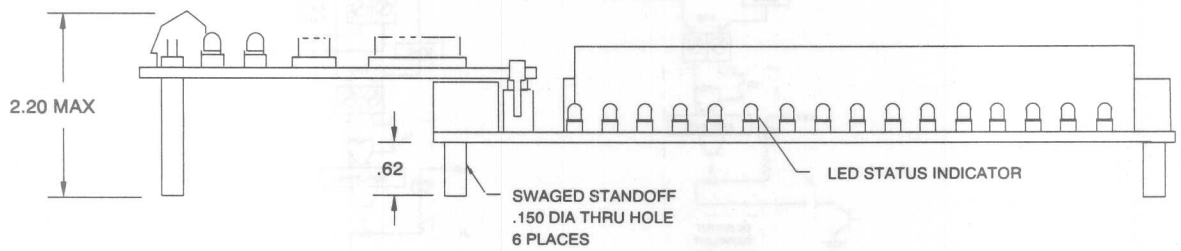
16 POSITION INTEGRAL DC OUTPUT CHANNEL RACK — 60 VDC — PB16L

SCHEMATIC

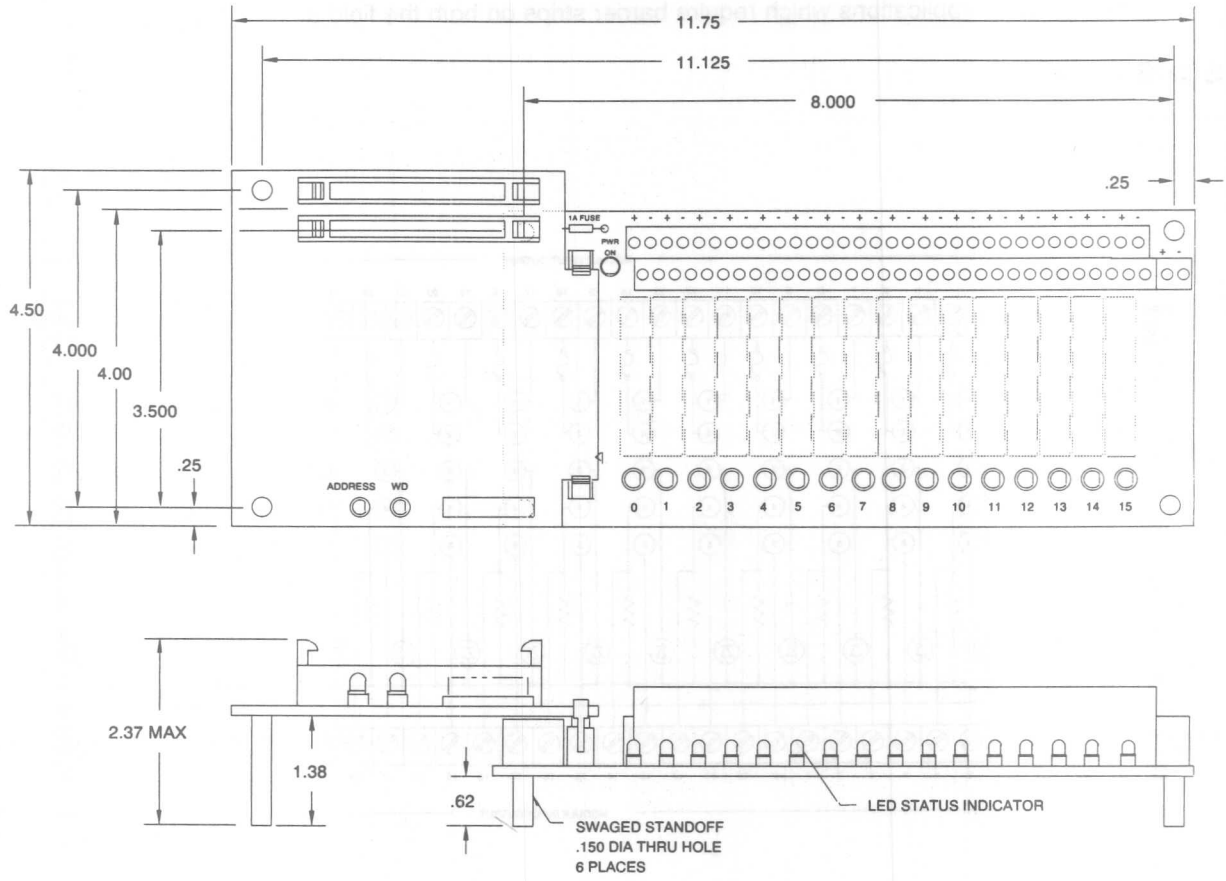


DIMENSIONS WITH OPTOMUX BRAIN BOARD (P/N B1)





DIMENSIONS WITH PAMUX BRAIN BOARD (P/N B5)



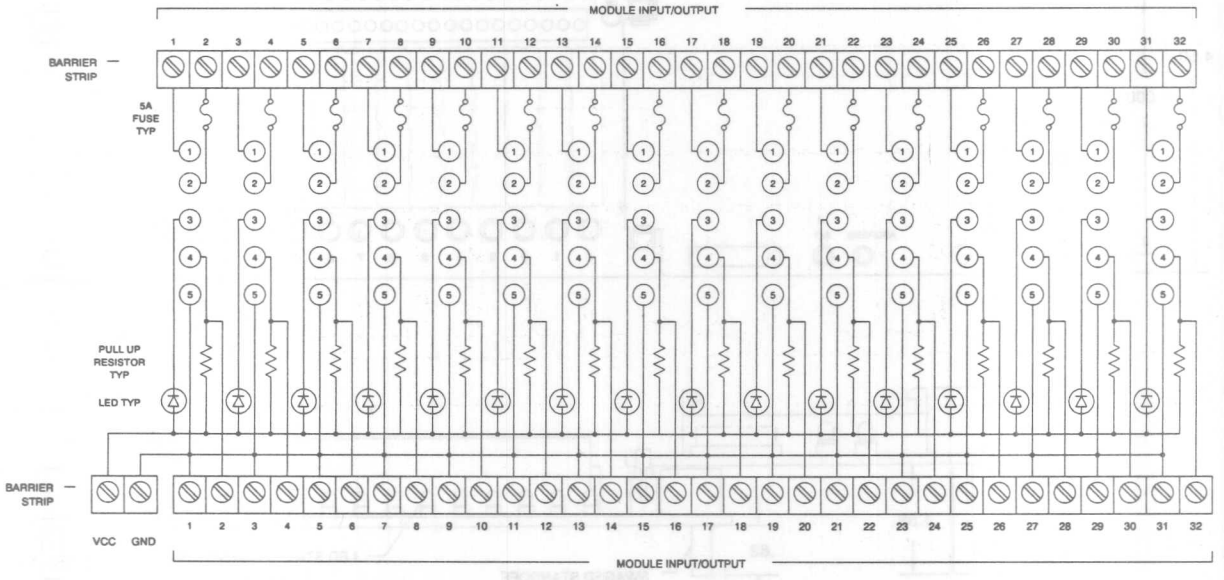
16 POSITION SINGLE CHANNEL I/O MOUNTING RACK

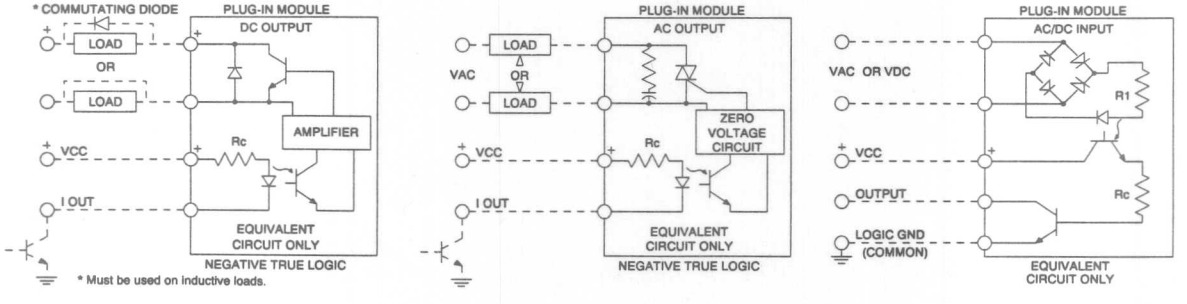
PB16T

DESCRIPTION

The PB16T I/O mounting rack accommodates up to 16 single channel I/O modules. It is designed for applications which require barrier strips on both the field and the logic sides.

SCHEMATIC





Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

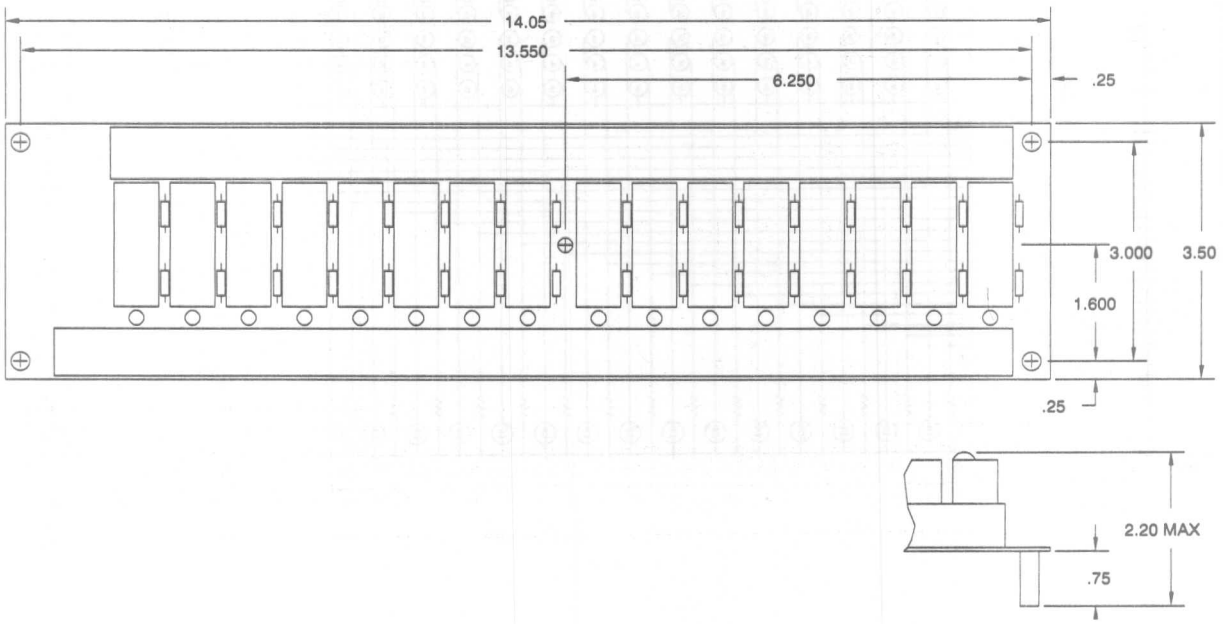
16 POSITION SINGLE CHANNEL I/O MOUNTING RACK

PB16T

SPECIFICATIONS

Operating Temperature:	0 to 70° C 95% relative humidity, non-condensing
Interface Connector:	
Field	6-32 screw terminals
Logic	6-32 screw terminals

DIMENSIONS



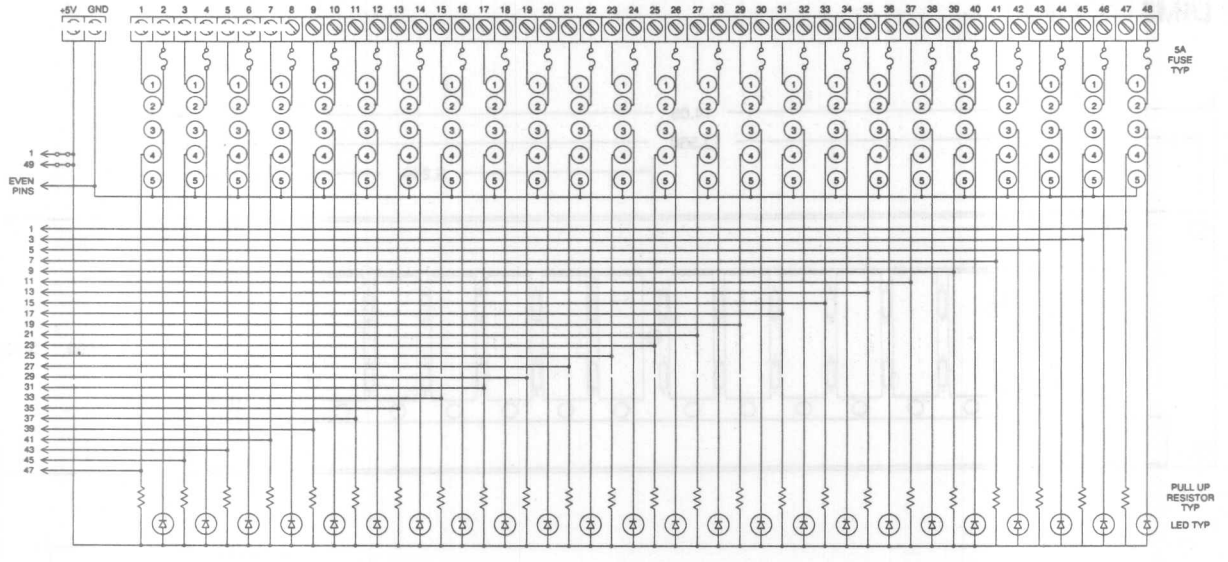
24 POSITION SINGLE CHANNEL I/O MOUNTING RACK

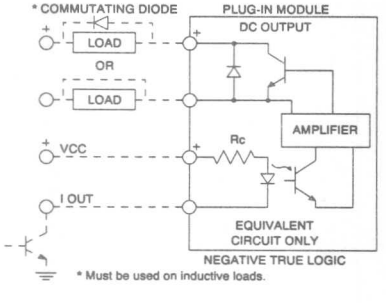
PB24

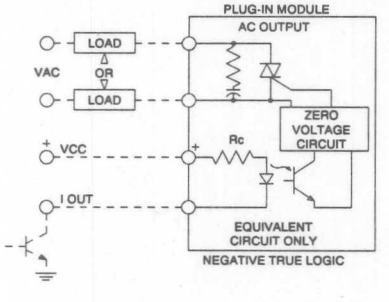
DESCRIPTION

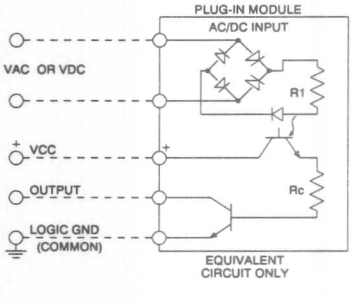
The PB24 I/O mounting rack can accommodate up to 24 single channel I/O modules. The PB24 I/O mounting rack uses a 50-pin card edge connector for interface to computer parallel I/O ports via a 50-conductor ribbon cable.

SCHEMATIC









Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

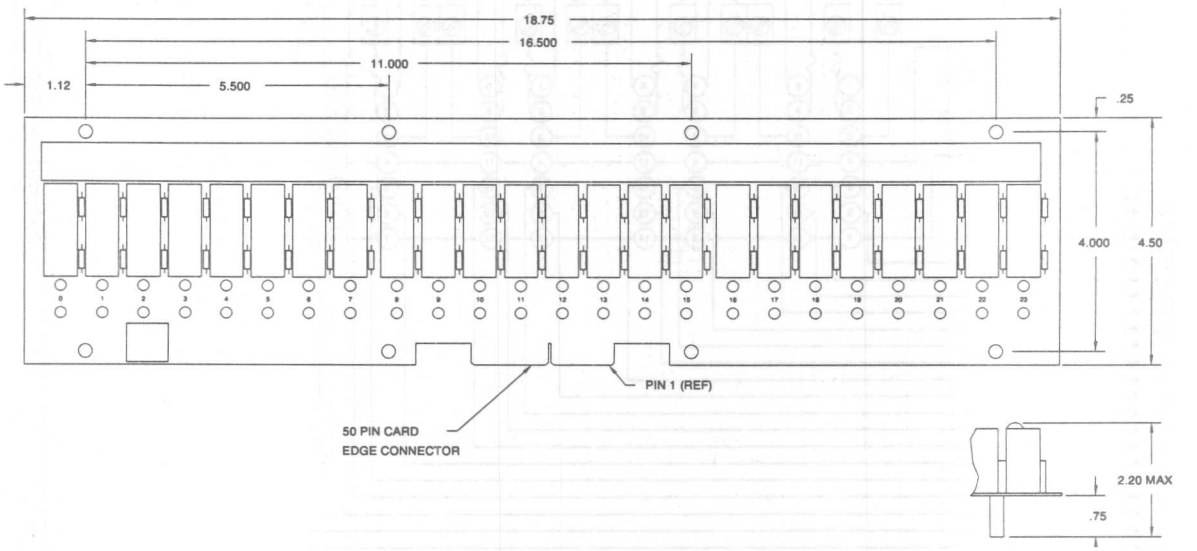
24 POSITION SINGLE CHANNEL I/O MOUNTING RACK

PB24

SPECIFICATIONS

Operating Temperature:	0 to 70° C 95% relative humidity, non-condensing
Interface Connector:	
Field	6-32 screw terminals
Logic	50-conductor edge card connector

DIMENSIONS



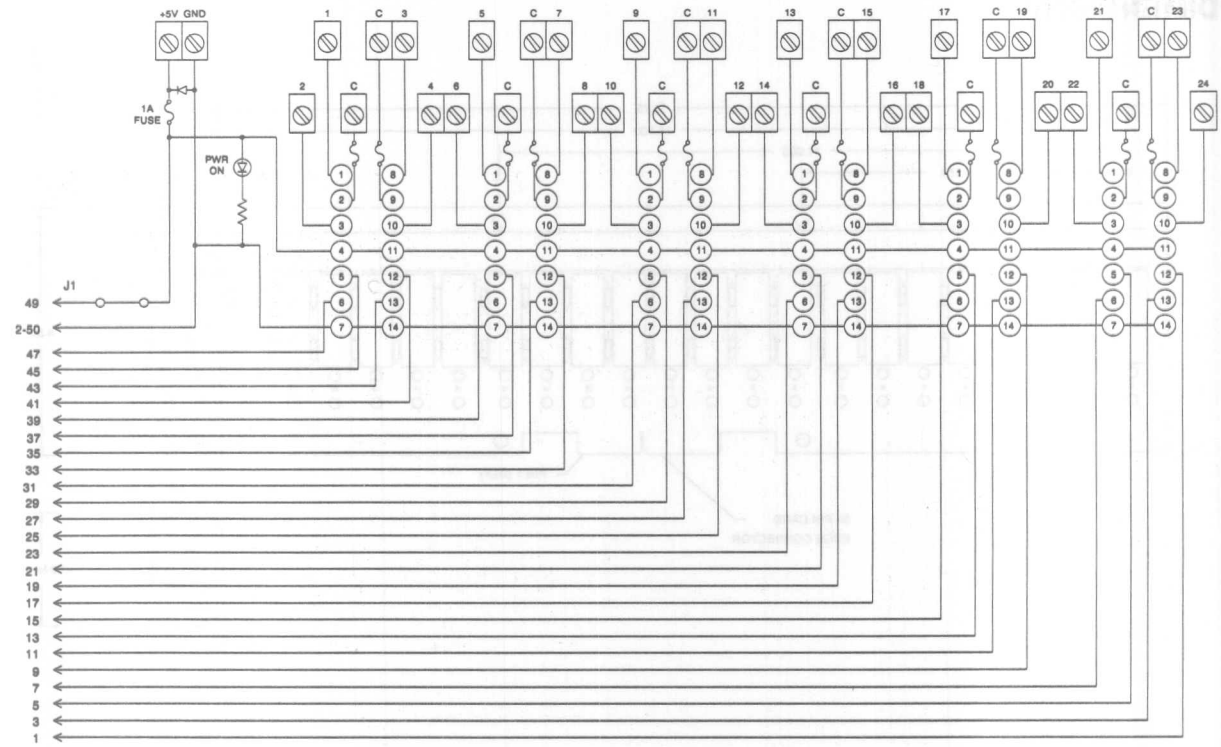
24 CHANNEL QUAD PAK I/O MOUNTING RACK

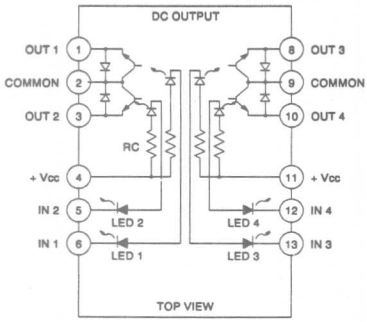
PB24HQ

DESCRIPTION

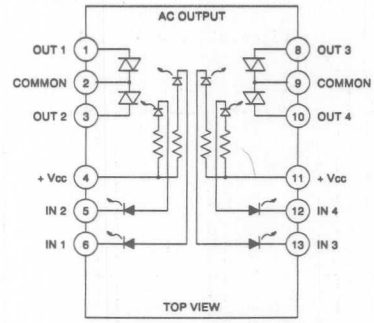
The PB24HQ I/O mounting rack can accomodate up to six Quad Pak I/O modules for a total of 24 I/O channels. The PB24HQ I/O mounting rack uses a 50-pin, male, header connector for connection to computer parallel I/O ports via a 50-conductor ribbon cable.

SCHEMATIC

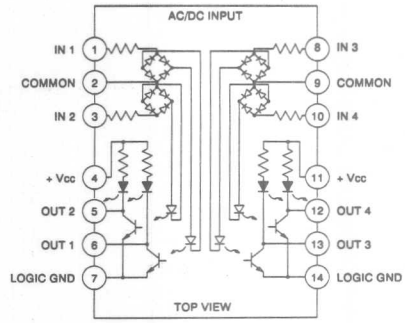




RED INDICATOR LED
INFRARED COUPLER LED
EQUIVALENT CIRCUIT ONLY
NEGATIVE TRUE LOGIC
INDUCTIVE LOADS MUST BE DIODE SUPPRESSED



RED INDICATOR LED
INFRARED COUPLER LED
EQUIVALENT CIRCUIT ONLY
NEGATIVE TRUE LOGIC



RED INDICATOR LED
INFRARED COUPLER LED
EQUIVALENT CIRCUIT ONLY
NEGATIVE TRUE LOGIC

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

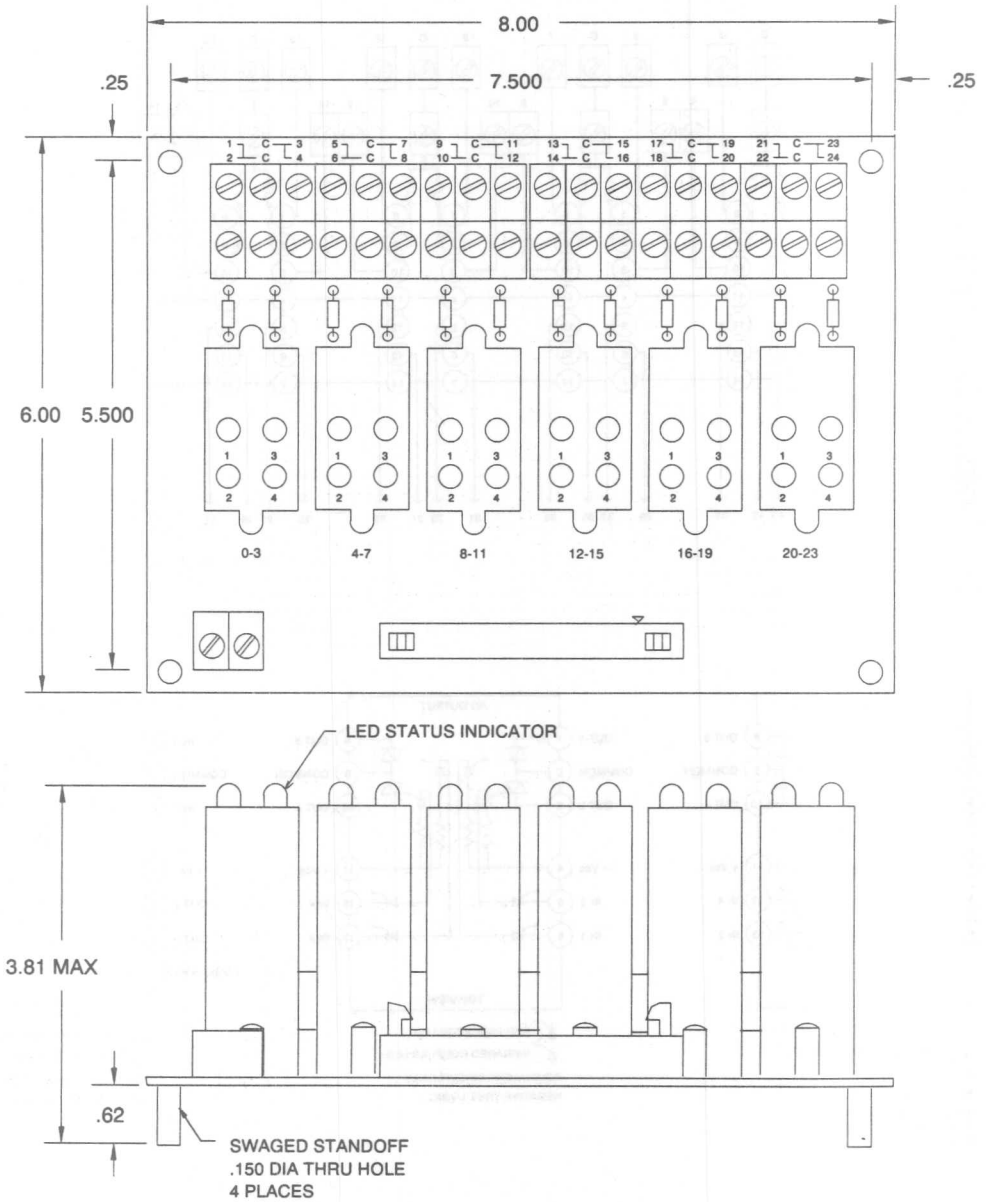
24 CHANNEL QUAD PAK I/O MOUNTING RACK

PB24HQ

SPECIFICATIONS

Operating Temperature:	0 to 70° C 95% relative humidity, non-condensing
Interface Connector:	
Field	6-32 screw terminals
Logic	50-pin, male header connector

DIMENSIONS



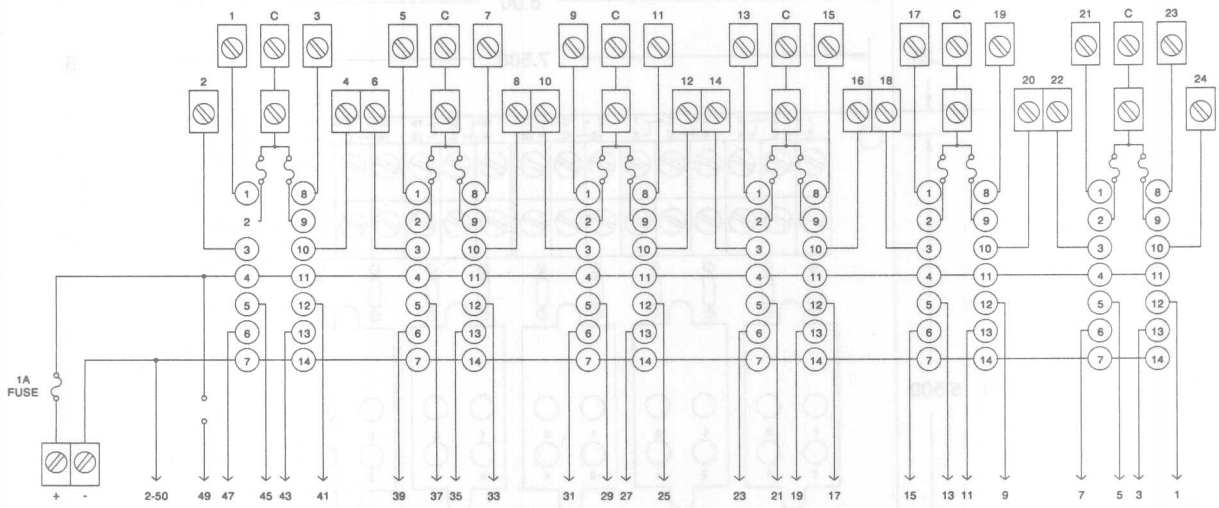
24 CHANNEL QUAD PAK I/O MOUNTING RACK

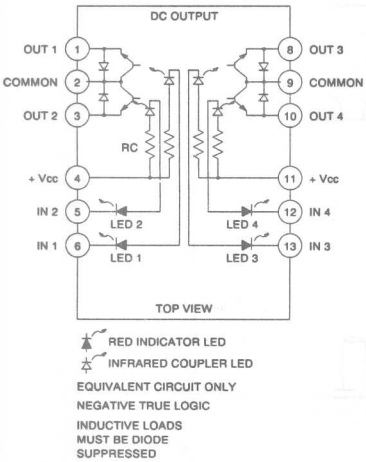
PB24Q

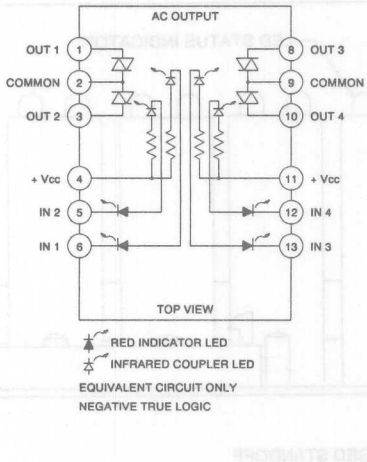
DESCRIPTION

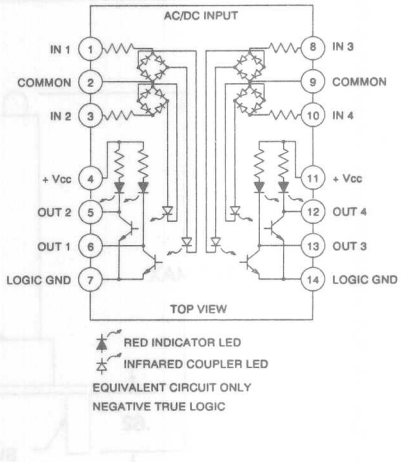
The PB24Q I/O mounting rack can accommodate up to six Quad Pak I/O modules for a total of 24 I/O channels. The PB24Q I/O mounting rack uses a 50-pin, card edge connector for interface to computer parallel I/O ports via a 50-conductor, ribbon cable.

SCHEMATIC









Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

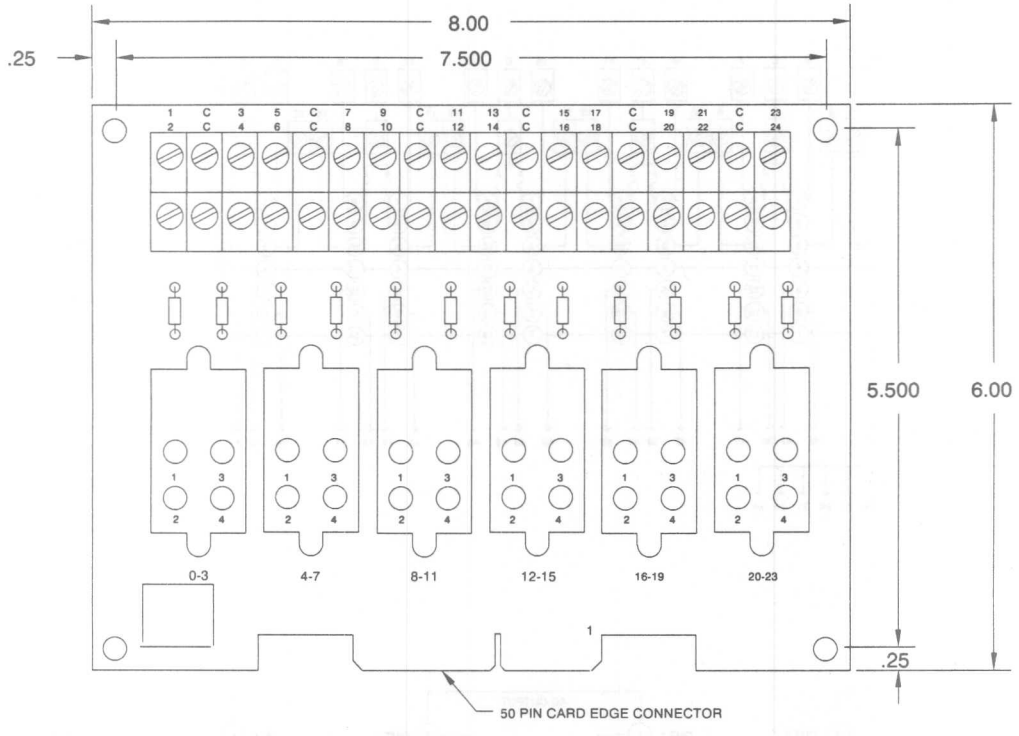
24 CHANNEL QUAD PAK I/O MOUNTING RACK

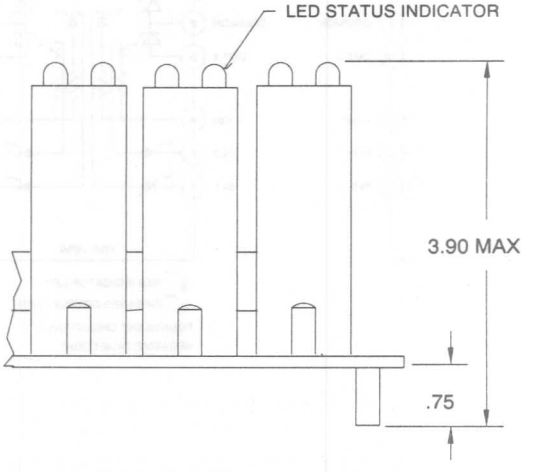
PB24Q

SPECIFICATIONS

Operating Temperature:	0 to 70° C 95% relative humidity, non-condensing
Interface Connector:	
Field	6-32 screw terminals
Logic	50-conductor, card edge connector

DIMENSIONS





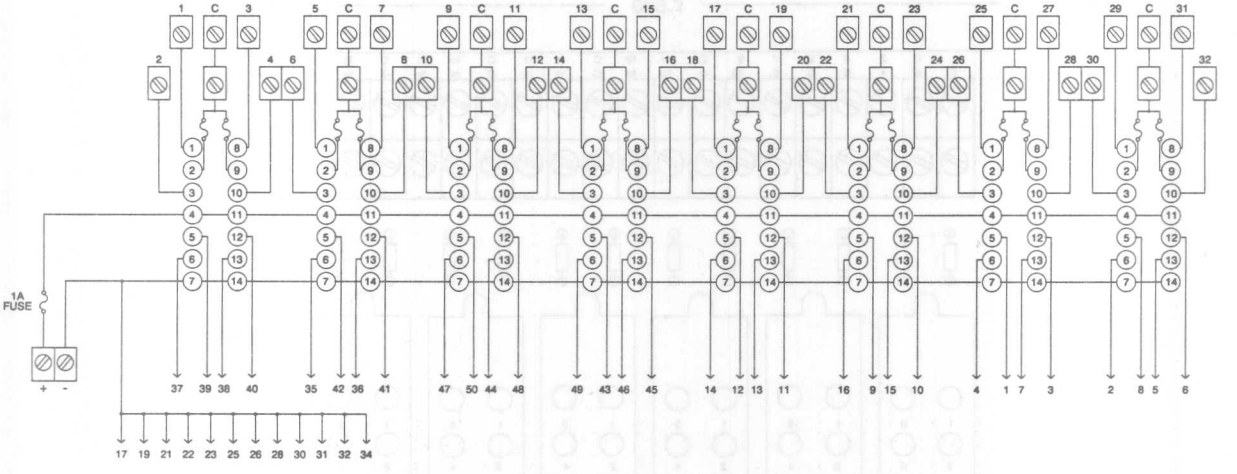
32 CHANNEL QUAD PAK I/O MOUNTING RACK

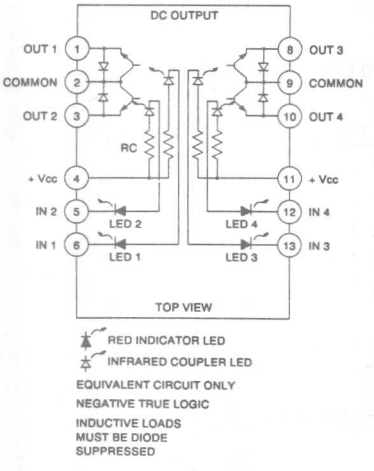
PB32DEC

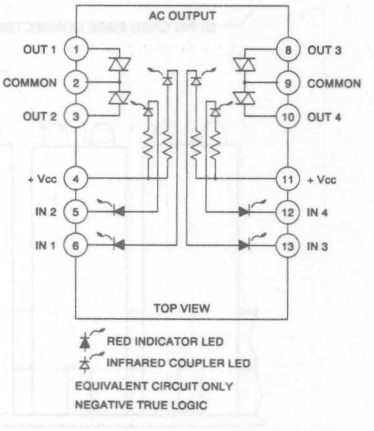
DESCRIPTION

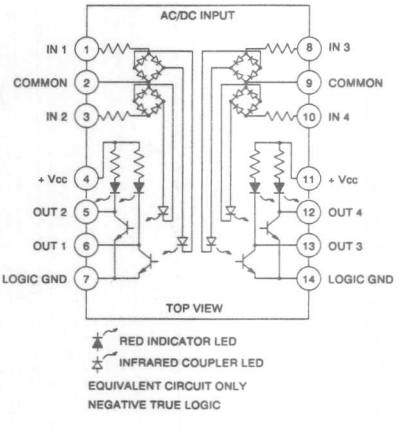
The PB32DEC I/O mounting rack is DEC Q-bus compatible (DEC DRV11-J required) and can accommodate up to eight Quad Pak I/O modules for a total of 32 I/O channels. The PB32DEC I/O mounting rack uses a 50-pin card edge connector for interface to computer parallel I/O ports via a 50-conductor, ribbon cable.

SCHEMATIC









Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

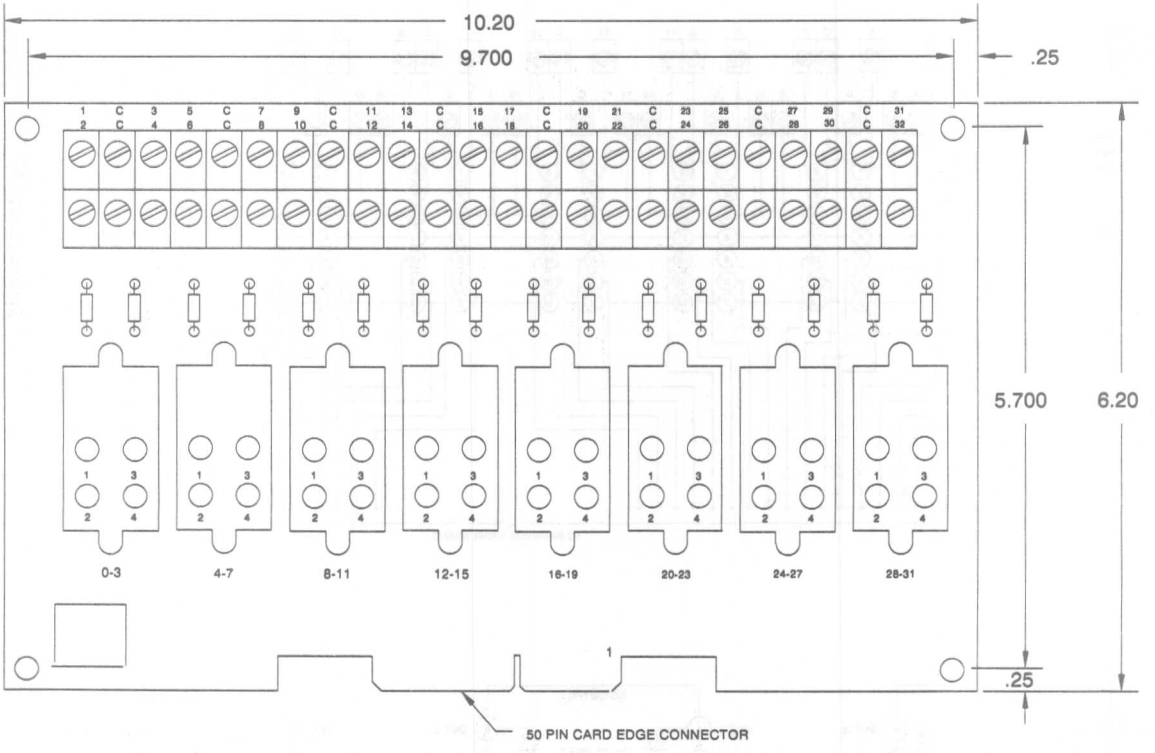
32 CHANNEL QUAD PAK I/O MOUNTING RACK

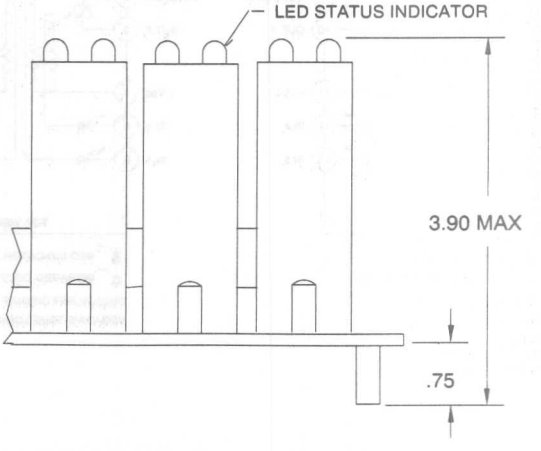
PB32DEC

SPECIFICATIONS

Operating Temperature:	0 to 70° C 95% relative humidity, non-condensing
Interface Connector:	
Field	6-32 screw terminals
Logic	50-conductor card edge connector

DIMENSIONS





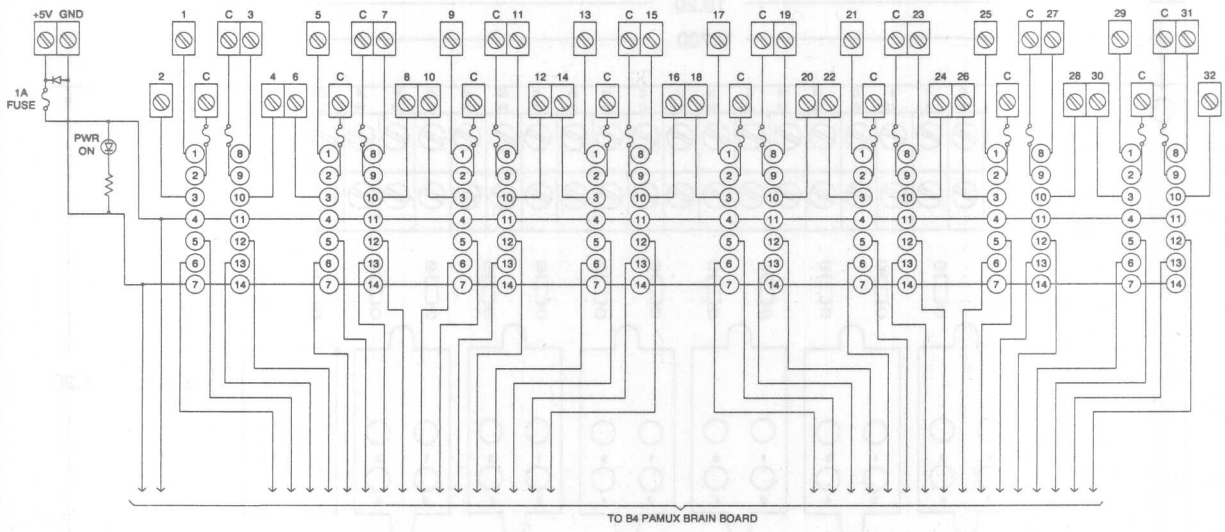
32 CHANNEL QUAD PAK I/O MOUNTING RACK

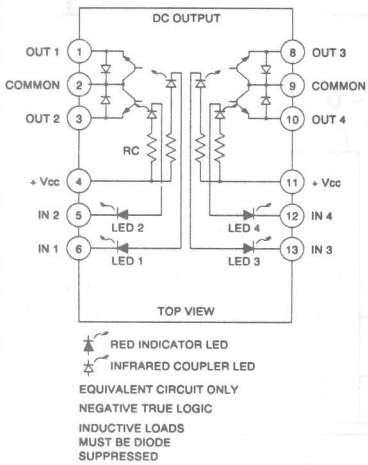
PB32HQ

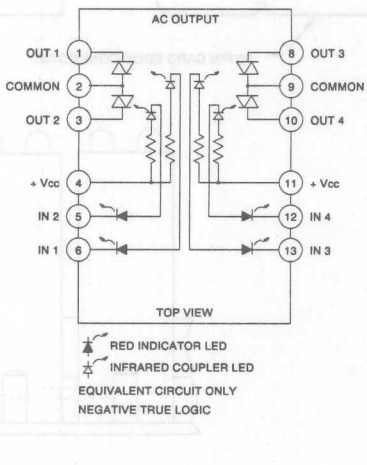
DESCRIPTION

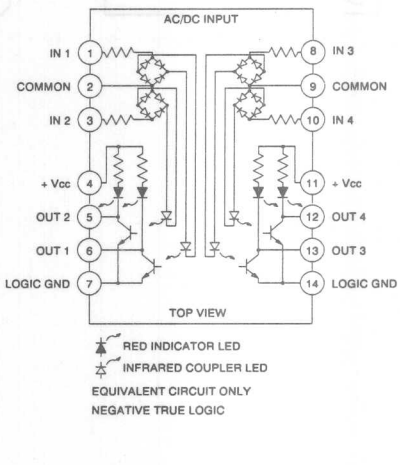
The PB32HQ I/O mounting rack is designed to mate with the PAMUX 32 channel Brain Board (P/N B4). The PB32HQ I/O mounting rack accommodates up to eight Quad Pak I/O modules for a total of 32 channels of power I/O. The B4 Brain Board plugs into a box connector on the I/O mounting rack and is secured by vertical card guides.

SCHEMATIC









Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

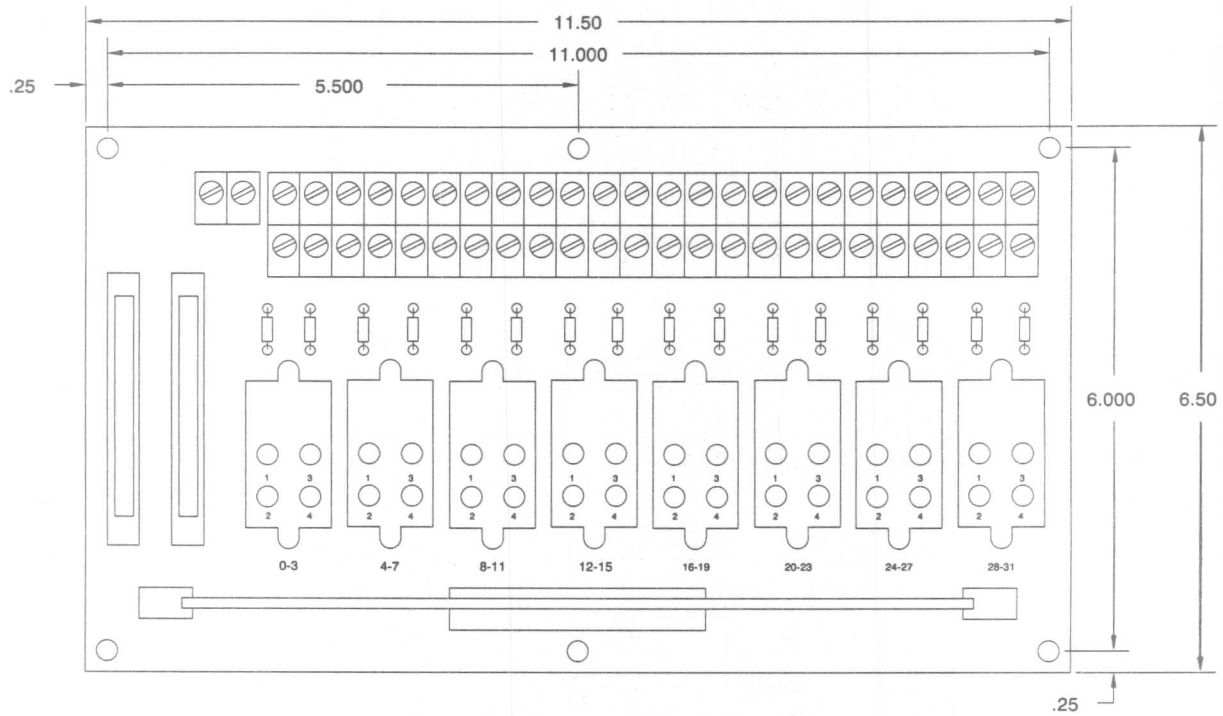
32 CHANNEL QUAD PAK I/O MOUNTING RACK

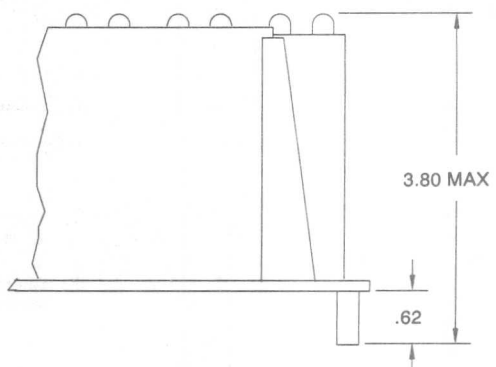
PB32HQ

SPECIFICATIONS

Operating Temperature:	0 to 70° C 95% relative humidity, non-condensing
Interface Connector:	
Field	6-32 screw terminals
Logic	70-pin box connector

DIMENSIONS





Notes:

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

SECTION 5

ANALOG I/O MOUNTING RACKS

DESCRIPTION	MODEL	PAGE
4 Position Analog I/O Mounting Rack	PB4AH	5 - 1
8 Position Analog I/O Mounting Rack	PB8AH	5 - 5
16 Position Analog I/O Mounting Rack	PB16AH	5 - 9

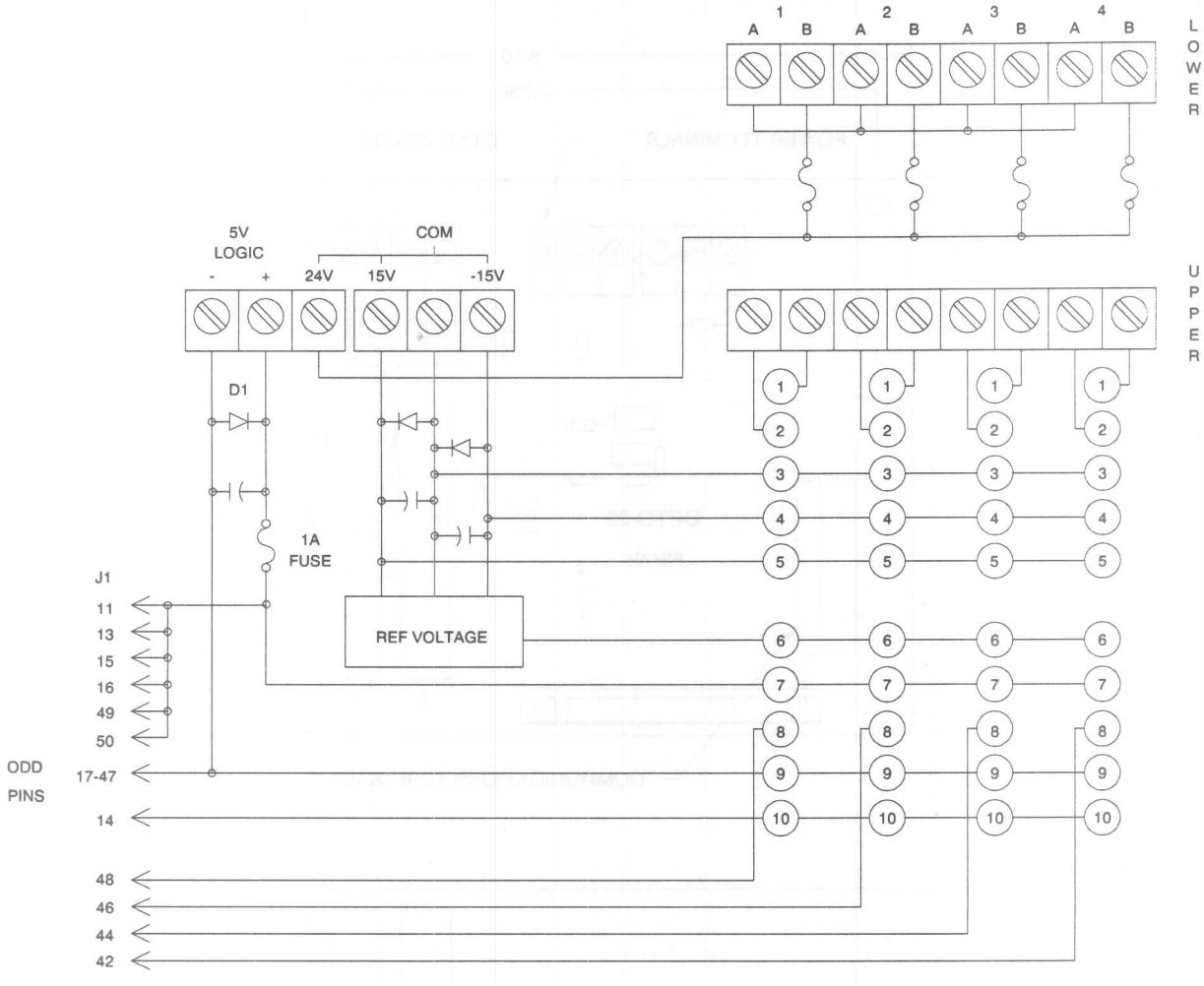
4 POSITION ANALOG I/O MOUNTING RACK

PB4AH

DESCRIPTION

The PB4AH I/O mounting rack can accommodate up to four analog I/O modules in any combination. The PB4AH is designed to interface to either OPTOMUX or PAMUX Brain Boards via a 50 pin header connector.

SCHEMATIC



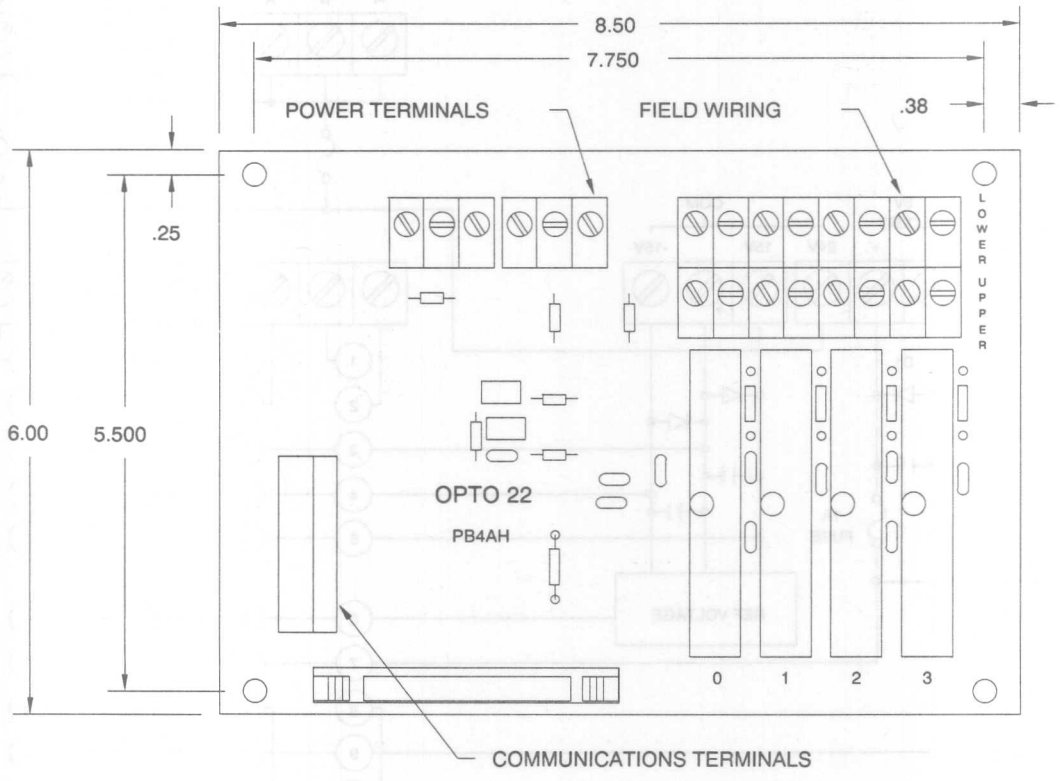
4 POSITION ANALOG I/O MOUNTING RACK

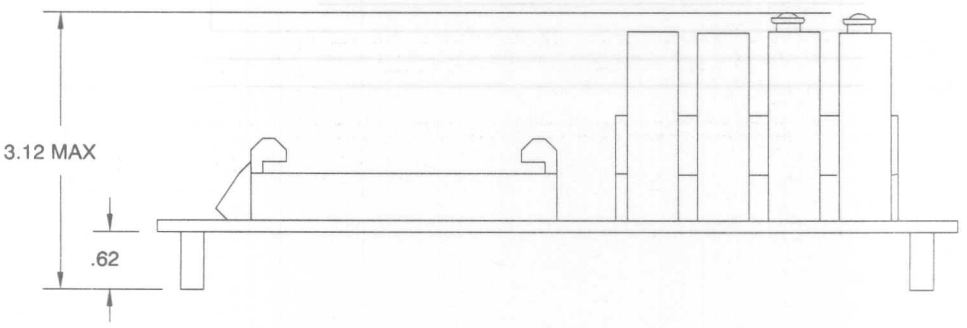
PB4AH

SPECIFICATIONS

Operating Temperature:	0 to 70° C 95% relative humidity, non-condensing
Interface Connector:	
Field	6-32 screw terminals
Logic	50 pin, male header connector

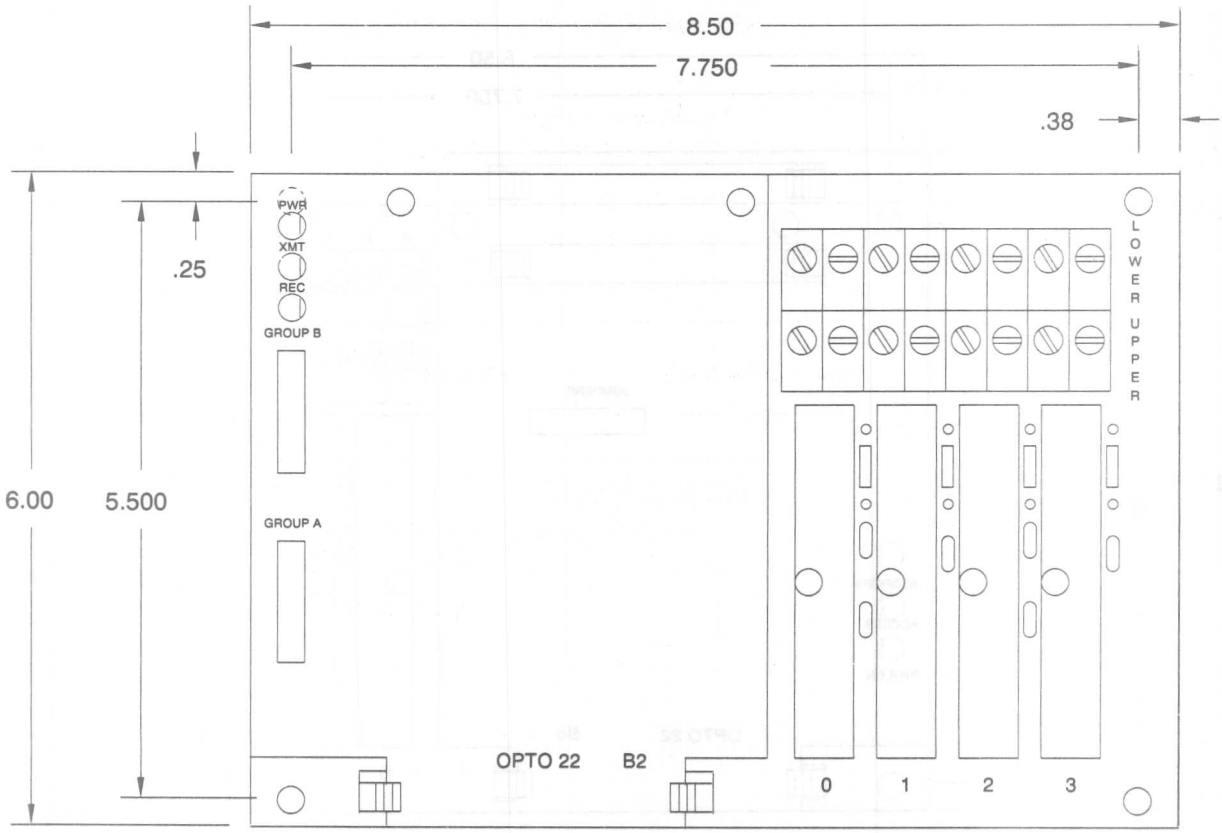
DIMENSIONS

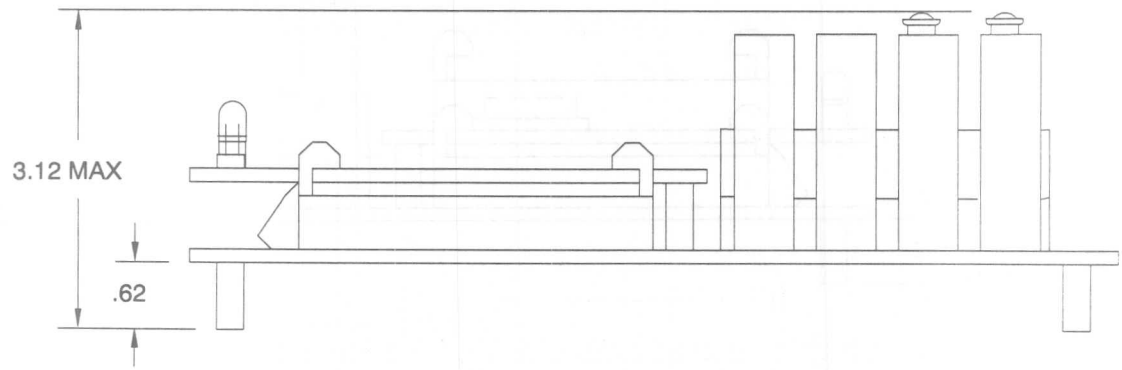




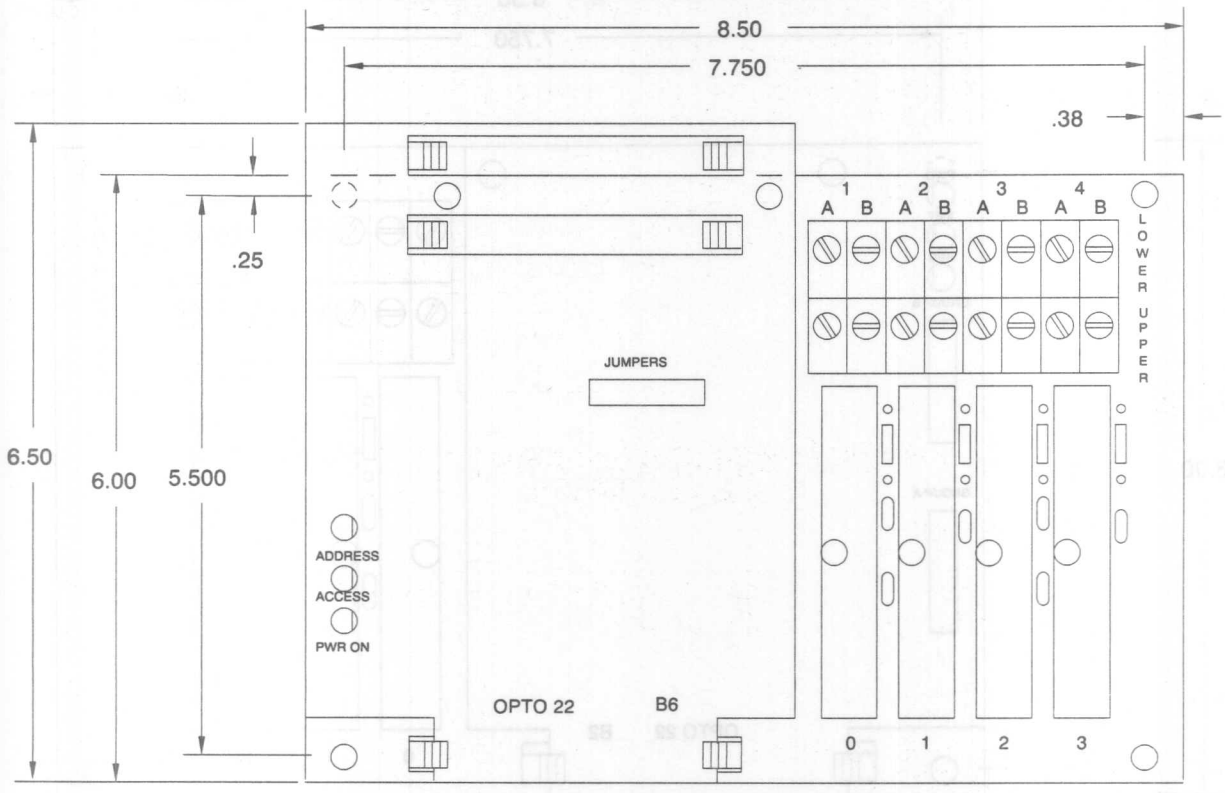
Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

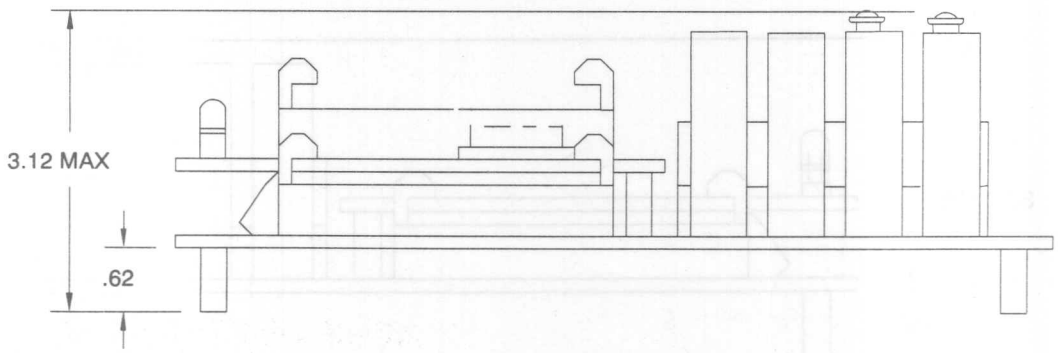
DIMENSIONS WITH OPTOMUX BRAIN BOARD (P/N B2)





DIMENSIONS WITH PAMUX BRAIN BOARD (P/N B6)





Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

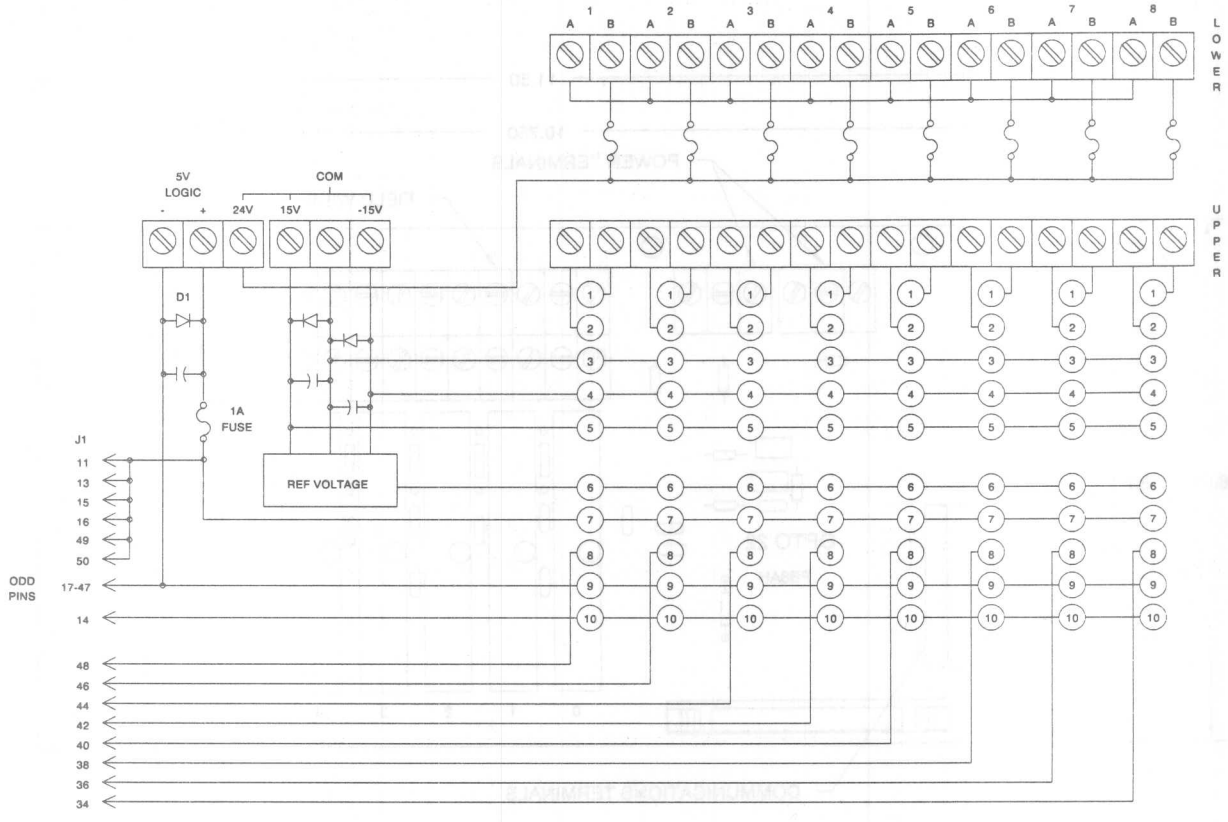
8 POSITION
ANALOG I/O MOUNTING RACK

PB8AH

DESCRIPTION

The PB8AH I/O mounting rack can accomodate up to eight analog I/O modules in any combination. The PB8AH is designed to interface to either OPTOMUX or PAMUX Brain Boards via a 50 pin header connector.

SCHEMATIC



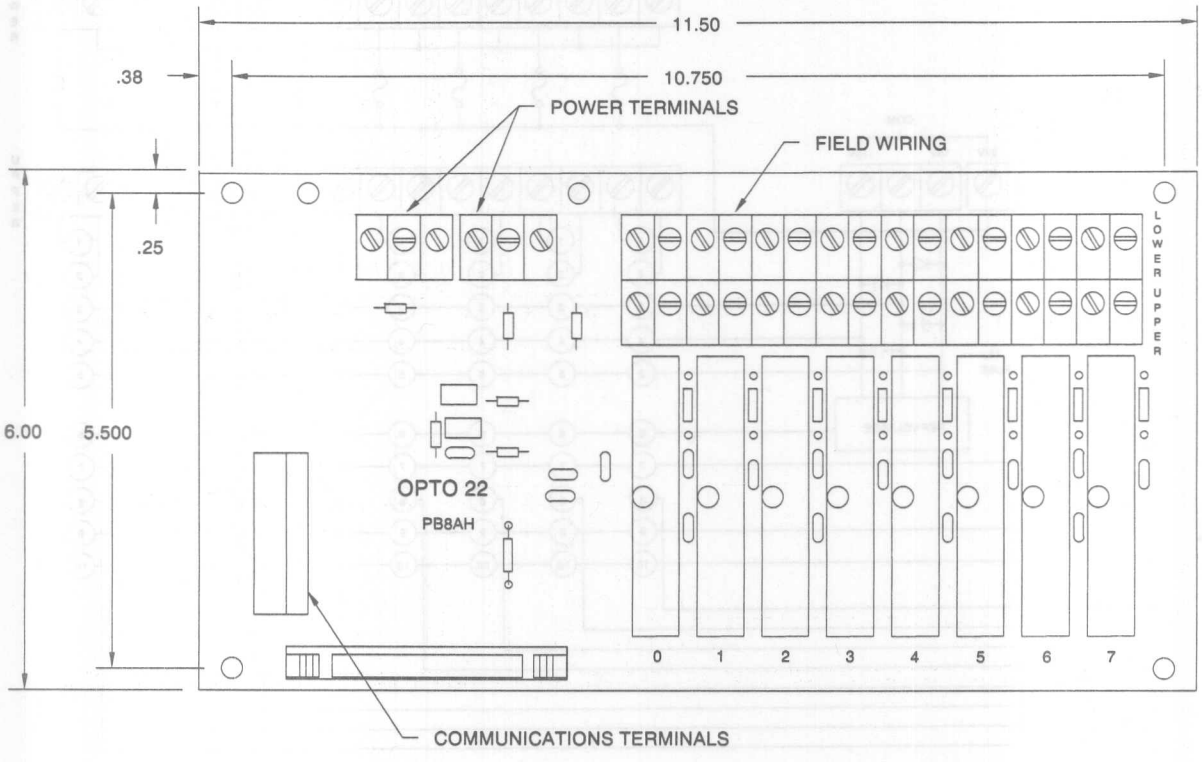
8 POSITION ANALOG I/O MOUNTING RACK

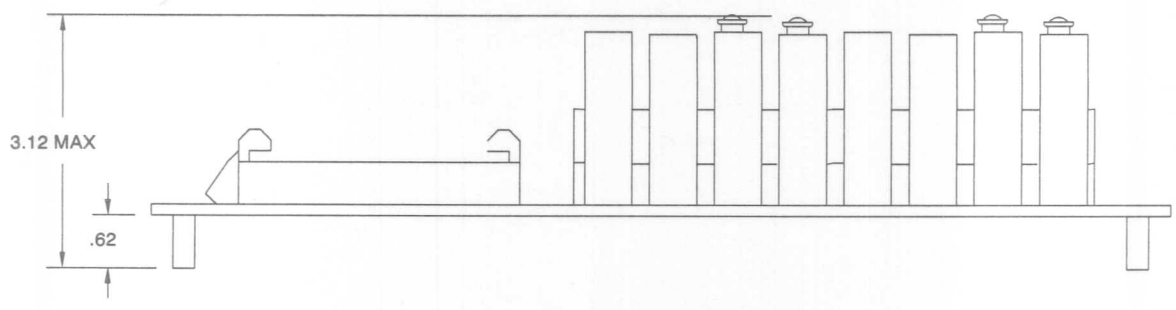
PB8AH

SPECIFICATIONS

Operating Temperature	0 to 70° C 95% relative humidity, non-condensing
Interface Connector:	
Field	6-32 screw terminals
Logic	50 pin, male header connector

DIMENSIONS





Opto 22
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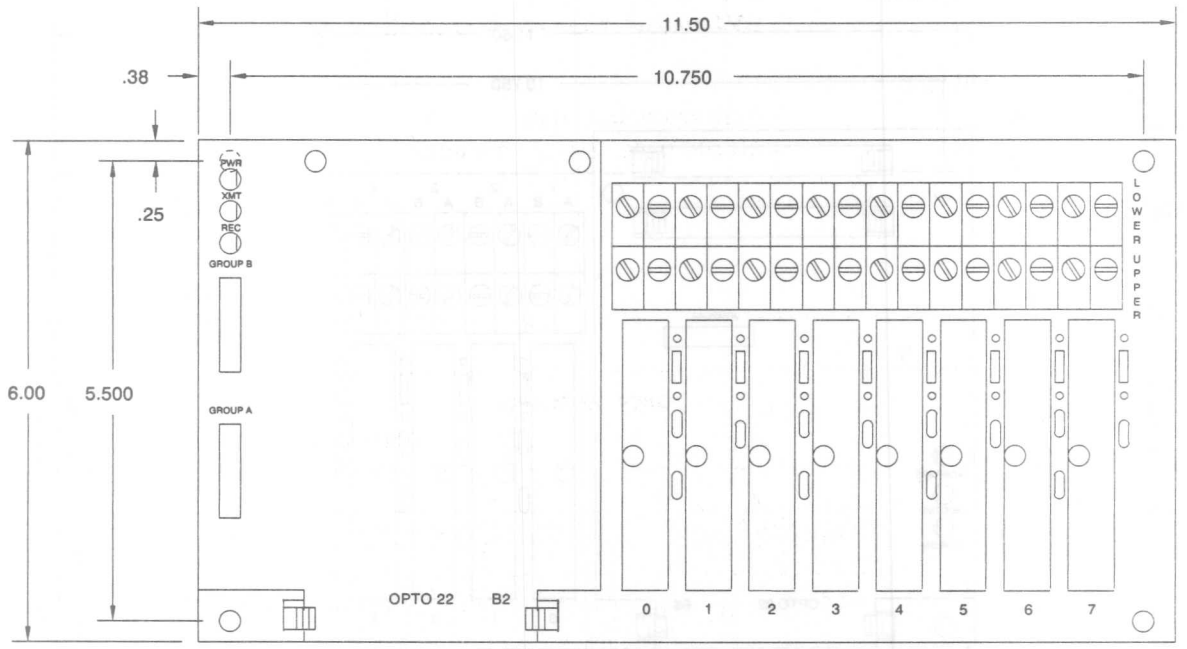
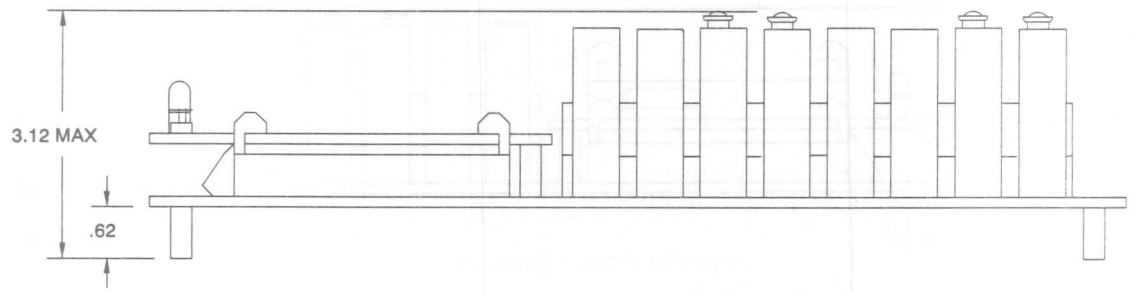
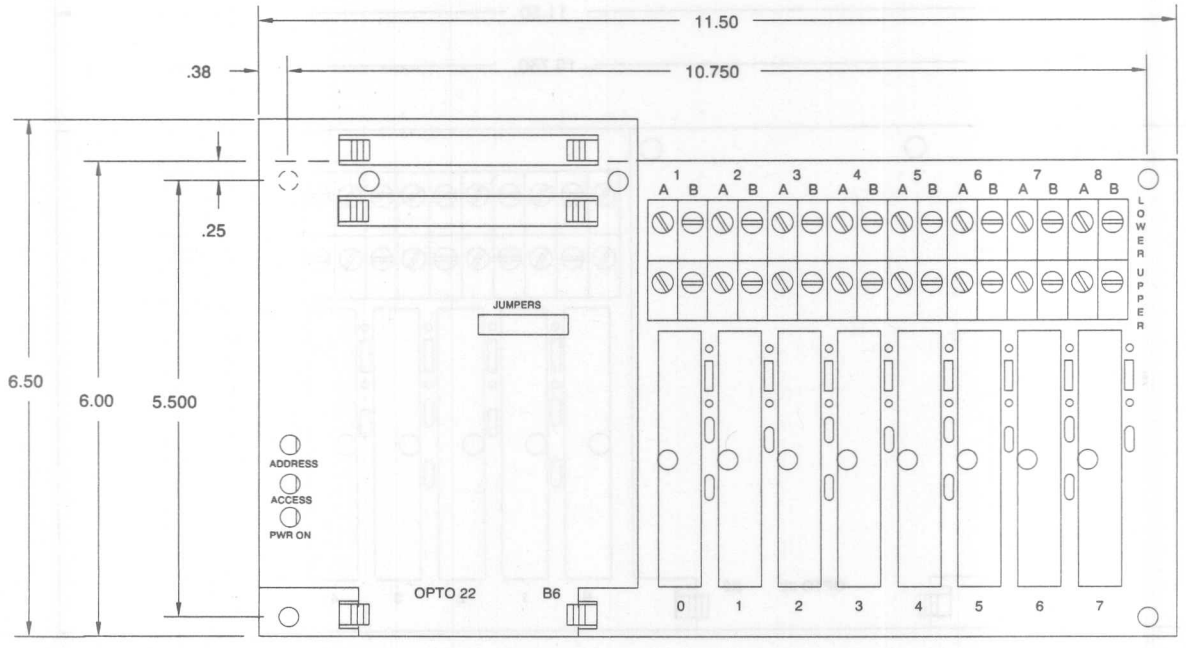
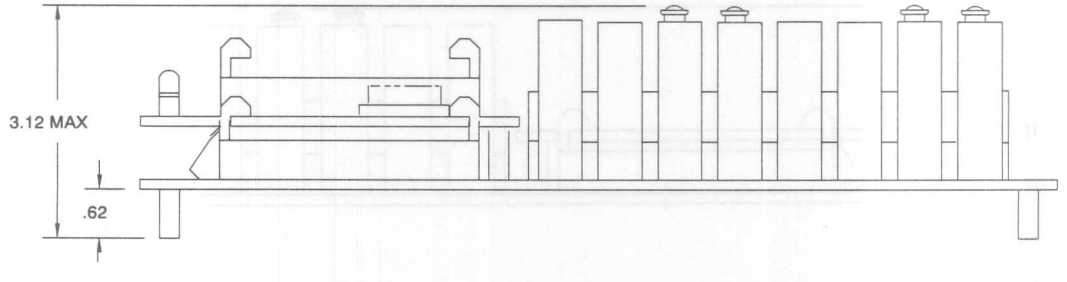
DIMENSIONS WITH OPTOMUX BRAIN BOARD (P/N B2)





DIMENSIONS WITH PAMUX BRAIN BOARD (P/N B6)





Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

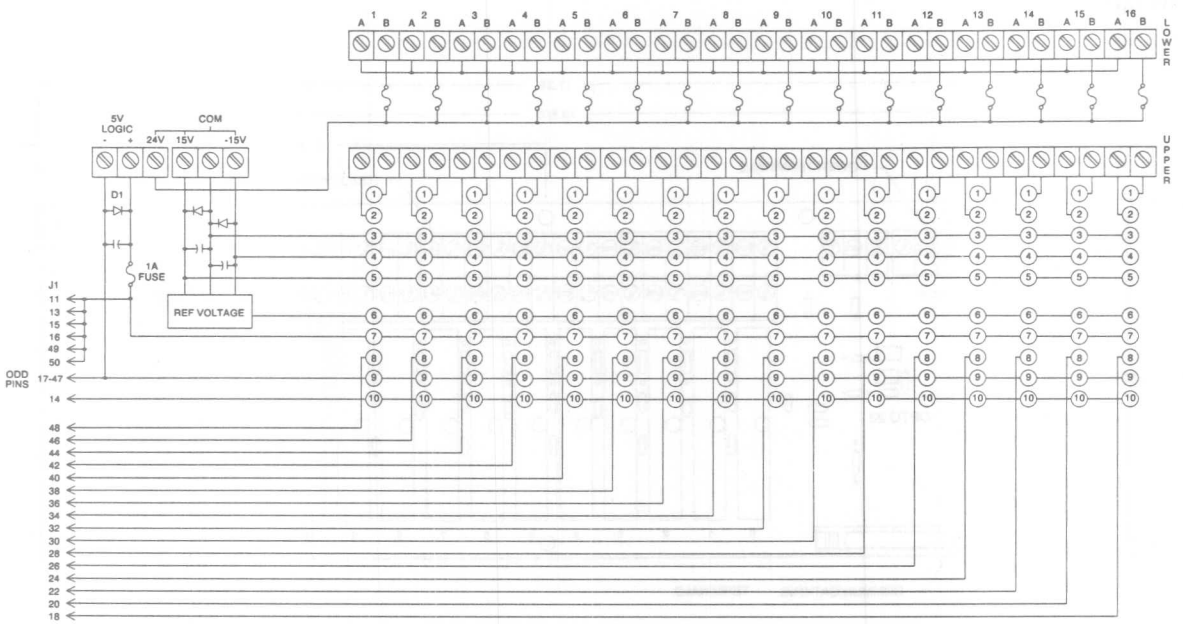
16 POSITION ANALOG I/O MOUNTING RACK

PB16AH

DESCRIPTION

The PB16AH I/O mounting rack can accommodate up to 16 analog I/O modules in any combination. The PB16AH is designed to interface to either OPTOMUX or PAMUX Brain Boards via a 50 pin header connector.

SCHEMATIC



16 POSITION ANALOG I/O MOUNTING RACK

PB16AH

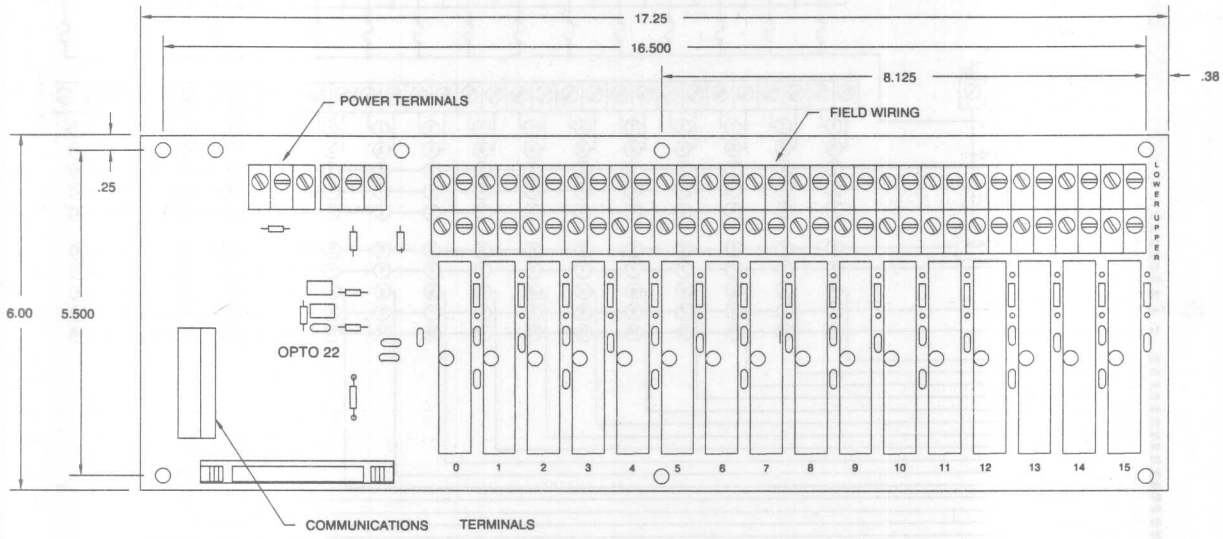
SPECIFICATIONS

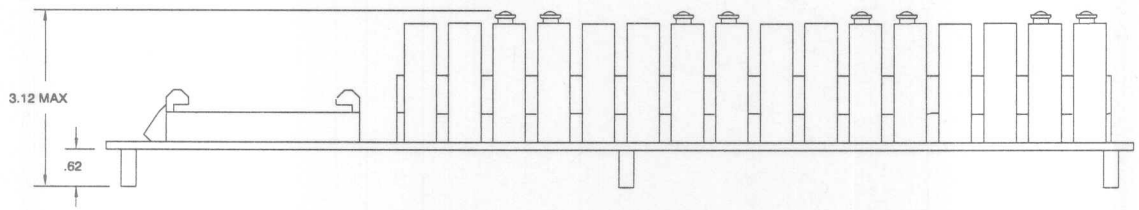
Operating Temperature: 0 to 70° C
95% relative humidity, non-condensing

Interface Connector:

Field	6-32 screw terminals
Logic	50 pin, male header connector

DIMENSIONS





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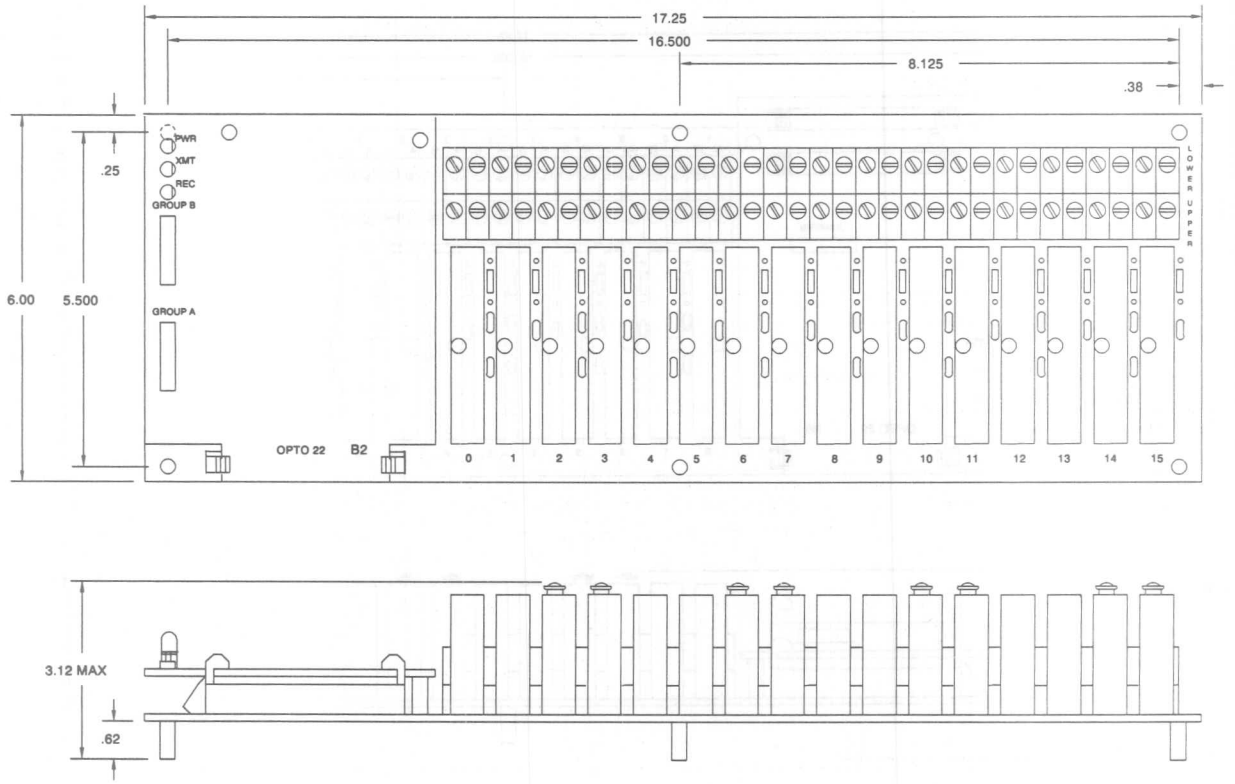
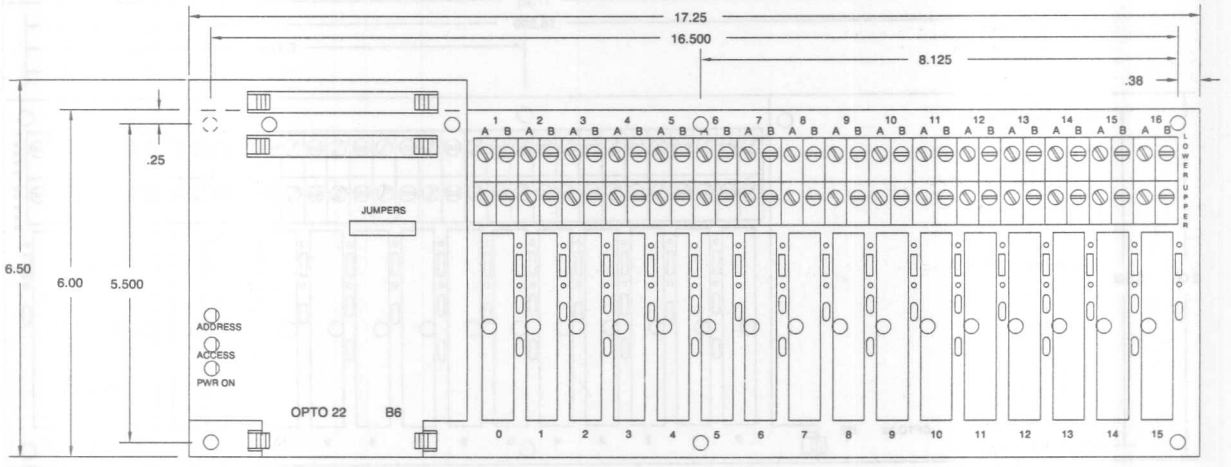
16 POSITION
ANALOG I/O MOUNTING RACK

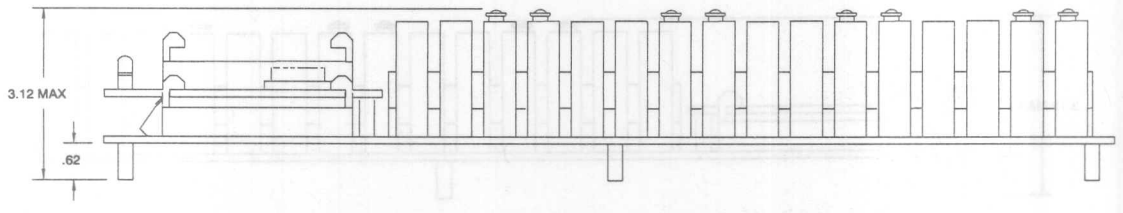
PB16AH

DIMENSIONS WITH OPTOMUX BRAIN BOARD (P/N B2)



DIMENSIONS WITH PAMUX BRAIN BOARD (P/N B6)





SECTION 6

DIGITAL I/O MODULES

DESCRIPTION	PAGE
Introduction	6 - 1
Single Channel I/O Modules	
Single Channel I/O Module Selection Guide	6 - 3
AC Input	6 - 4
AC Output	6 - 8
DC Input	6 - 12
DC Output	6 - 17
Dry Contact Output	6 - 21
Input Test Module	6 - 24
Output Test Module	6 - 25
Quad Pak I/O Modules	
Quad Pak I/O Module Selection Guide	6 - 26
AC Input	6 - 27
AC Output	6 - 31
DC Input	6 - 35
DC Output	6 - 39
Flat Pak I/O Modules	
Flat Pak I/O Module Selection Guide	6 - 43
AC Input	6 - 44
AC Output	6 - 47
DC Input	6 - 50
DC Output	6 - 53

DIGITAL I/O MODULES

INTRODUCTION

Opto 22 offers a wide variety of general purpose input/output (I/O) modules and I/O mounting racks which provide optically isolated I/O control from a computer. The I/O modules serve several purposes when computers are used to monitor or control devices in an industrial environment. Input modules can translate a variety of AC or DC voltage levels from field devices to a voltage level a computer can understand. Output modules are used to convert computer signals to levels a field device can use. All I/O modules isolate the computer or logic side from electrical transients, accidental short circuits, and excessive voltages. I/O modules are built for long life and can withstand the shock and vibration which occur in industrial environment.

Opto 22 I/O modules provide four functions: AC Input, AC Output, DC Input, and DC Ouput. In addition, INPUT SWITCH and OUTPUT SWITCH modules are available for system checkout and simulation. The I/O modules are available as single channel modules, high-density Quad Pak, and Flat Pak modules. I/O mounting racks are available for the single channel and Quad Pak modules. The Quad Pak I/O modules contain four of the single channel modules in one high-density package.

The I/O mounting racks for the single channel and Quad Pak I/O modules allow direct connection to computers via a multi-conductor ribbon cable. For distributed systems or applications with large I/O point counts, combine an I/O mounting rack with an OPTOMUX or PAMUX Brain Board to create a serial or parallel addressable distributed systems, respectively.

The Flat Pak I/O modules are ideal for printed circuit board applications that mount on 1/2" centers. The Flat Pak I/O modules provide the same function and performance as Opto 22's industry standard, single channel I/O modules. Sockets are available so that the Flat Pak I/O modules can be used as plug-in modules.

BENEFITS

- True plug-in type per NEMA ICS 2-230.02
- Ideal for relay replacement in many applications
- Easy interfacing to computers
- Isolation between computer circuitry and field devices
- Short circuit protection
- Provides immunity against adverse environments

INTERFACING TO A COMPUTER

Power I/O modules can be operated directly with microcomputer Peripheral Interface Adapter (PIA) chips (6522, 6821, and 8255A are typical) and TTL logic families (74, 74LS, and 74S are typical) without buffering. In the case of the I/O modules with a 5 V_{cc}, 12 milliamperes is required to turn the module "ON" when installed in an Opto 22 I/O mounting rack.

Since the I/O module operates with negative true logic, the interface chip is required to sink 12 milliamperes. The specification for these chips usually does not specify the ability to sink 12 milliamperes. However, the specification for sink current capability is for operation with other TTL logic elements where V_{sat} must be maintained at 0.7 V or less. The I/O module is not a TTL logic element and can operate with a V_{sat} of approximately 1.5 V where an interface chip can easily provide 12 milliamperes.

SINGLE CHANNEL I/O MODULE SELECTION GUIDE

Logic Voltage	5	15	24
AC INPUT			
12 - 32 VAC	IDC5	IDC15	IDC24
35 - 60 VAC	IDC5G	—	—
90 - 140 VAC	IAC5	IAC15	IAC24
180 - 280 VAC	IAC5A	IAC15A	—
AC OUTPUT			
12 - 140 VAC	OAC5	OAC15	OAC24
24 - 280 VAC	OAC5A	OAC15A	OAC24A
24 - 280 VAC	OAC5A5 (Normally Closed, NC)	—	—
DC INPUT			
4 - 16 VDC	IDC5B	—	—
2.5 - 28 VDC	IDC5D	—	—
10 - 32 VDC	IDC5	IDC15	IDC24
35 - 60 VDC	IDC5G	—	—
90 - 140 VDC	IAC5	IAC15	IAC24
180 - 280 VDC	IAC5A	IAC15A	—
DRY CONTACT OUPUT			
100 VDC/130 VAC	ODC5R	—	—
DC OUTPUT			
5 - 60 VDC	ODC5	ODC15	ODC24
5 - 200 VDC	ODC5A	—	—
TEST MODULES			
Input	INPUT SWITCH	INPUT SWITCH	INPUT SWITCH
Output	OUTPUT SWITCH	OUTPUT SWITCH	OUTPUT SWITCH

AC INPUT MODULES
SINGLE CHANNEL, PLUG-IN

12 - 32 VAC
35 - 60 VAC
90 - 140 VAC
180 - 280 VAC

DESCRIPTION

AC input modules are used for sensing ON/OFF alternating current (AC) voltage levels. All AC input modules are designed with filtering on the input and a hysteresis amplifier for high noise rejection and transient free "clean" switching. Each module provides up to 4000 V_{rms} of optical isolation between the field inputs and the logic side of the circuit.

Typical uses and applications include sensing the presence or absence of voltage or sensing contact closures from sources such as:

- Proximity Switches
- Limit Switches
- Selector Switches
- Push Button And Toggle Switches
- Thermostats

FEATURES

- Industry standard plug-in module
- 4000 VAC optical isolation
- UL recognized #E58169
- CSA certified #35852
- 5, 15, and 24 VDC logic levels
- Operating temperature: -30 to 70° C
- Built-in filtering for transient suppression and noise rejection

ORDERING GUIDE

Input Voltage VAC	Logic Voltage	Part Number
12 - 32	5	IDC5
35 - 60	5	IDC5G
90 - 140	5	IAC5
180 - 280	5	IAC5A
15 - 32	15	IDC15
90 - 140	15	IAC15
180 - 280	15	IAC15A
15 - 32	24	IDC24
90 - 140	24	IAC24

NOTE: The OPTOMUX and PAMUX networks only use I/O modules with a 5 VDC logic voltage.

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SPECIFICATIONS

GENERAL - Applies To All Models

Operating Ambient Temperature:	-30 to 70° C
Isolation Input-To-Output:	4000 V_{rms}
Output Voltage Drop:	0.4 Volts @ 50 milliamperes
Output Current:	50 milliamperes
Output Leakage With No Input:	100 microamperes maximum @ 30 VDC
Output Transistor:	30 Volts breakdown

	Units	IDC5	IDC5G	IDC15	IDC24
Input Voltage Range:	VAC	12 - 32	35 - 60	12 - 32	12 - 32
Input Current @ Maximum Line:	mA	25	6	25	25
Turn-on Time:	msec	5	10	5	5
Turn-off Time:	msec	5	10	5	5
Input Allowed For No Output:	mA, V	1, 3	0.8, 9	1, 3	1, 3
Logic Supply Voltage-Nominal:	VDC	5	5	15	24
Logic Supply Voltage Range:	VDC	4.5 - 6	4.5 - 6	12 - 18	20 - 30
Logic Supply Current: @ Nominal Logic Voltage*	mA	12	12	15	15
Input Resistance: (R1 in Schematic Diagram)	Ohms	1.5k	10k	1.5k	1.5k
Control Resistance: (Rc in Schematic Diagram)	Ohms	220	220	1k	2.2k

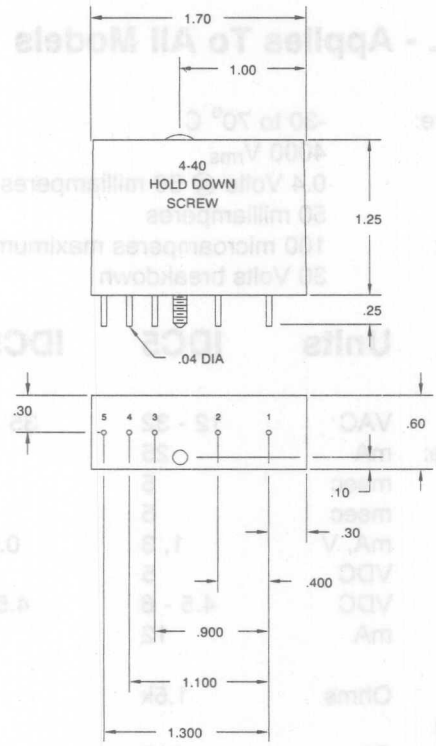
	Units	IAC5	IAC15	IAC24	IAC5A	IAC15A
Input Voltage Range:	VAC	90 - 140	90 - 140	90 - 140	180 - 280	180 - 280
Input Current @ Maximum Line:	mA	11	11	11	6.5	6.5
Turn-on Time:	msec	20	20	20	20	20
Turn-off Time:	msec	20	20	20	20	20
Input Allowed For No Output:	mA, V	3, 45	3, 45	3, 45	1.7, 80	1.7, 80
Logic Supply Voltage-Nominal:	VDC	5	15	24	5	15
Logic Supply Voltage Range:	VDC	4.5 - 6	12 - 18	20 - 30	4.5 - 6	12 - 18
Logic Supply Current: @ Nominal Logic Voltage*	mA	12	15	18	12	15
Input Resistance: (R1 in Schematic Diagram)	Ohms	14k	14k	14k	4k	43k
Control Resistance: (Rc in Schematic Diagram)	Ohms	220	1k	2.2k	220	1k

* When plugged into an Opto 22 I/O mounting rack.

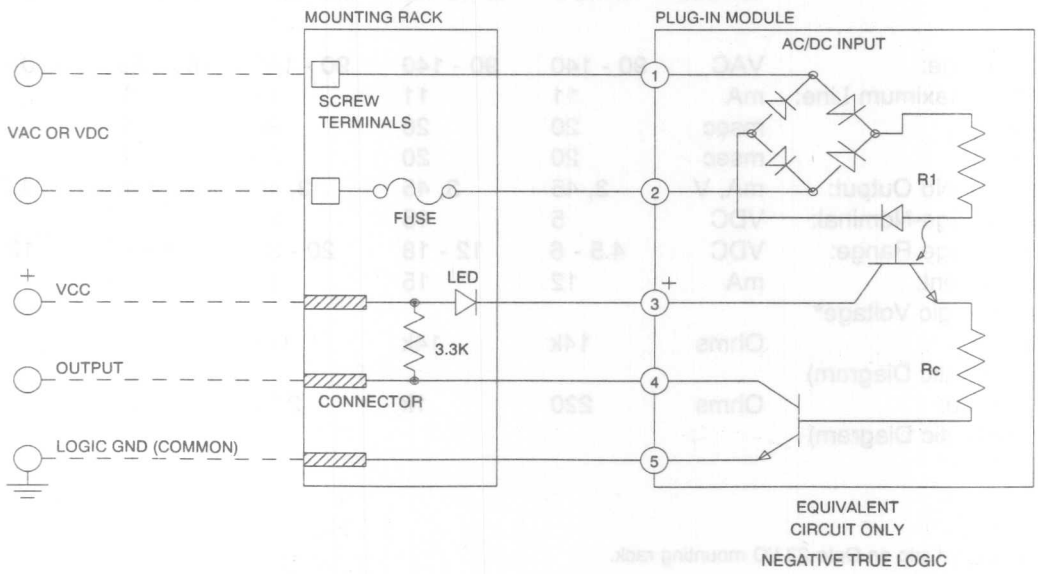
AC INPUT MODULES
SINGLE CHANNEL, PLUG-IN

12 - 32 VAC
35 - 60 VAC
90 - 140 VAC
180 - 280 VAC

DIMENSIONS



SCHEMATIC



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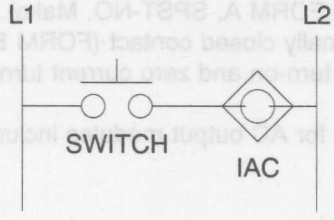
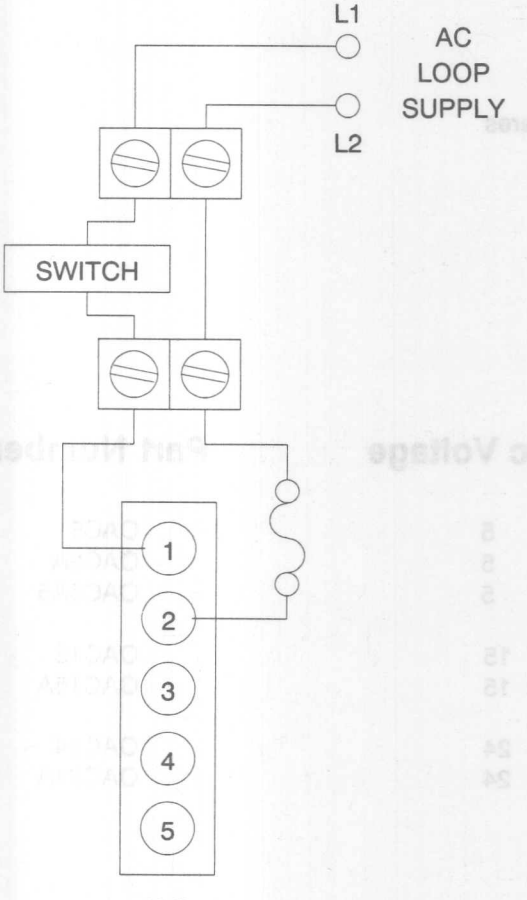
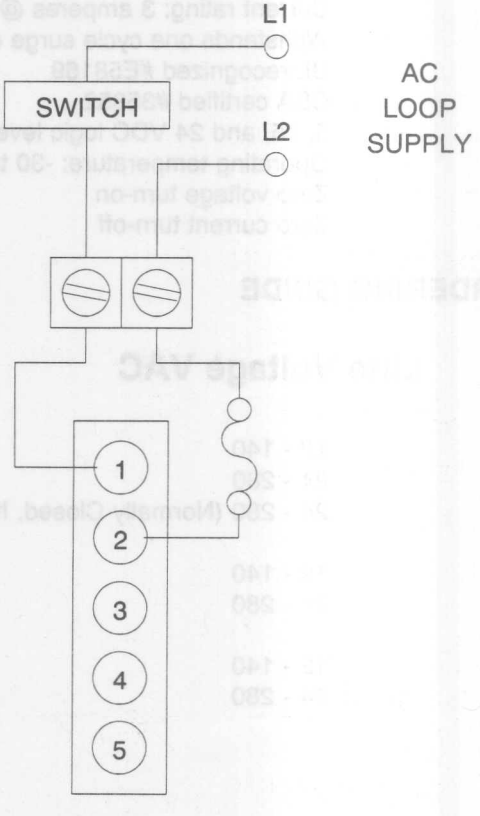
WIRING



LINE
SYMBOL



IAC
USING RACKS
WITH EXTRA
TERMINAL STRIP



IAC
USING
STANDARD
MOUNTING RACK

AC OUTPUT MODULES
SINGLE CHANNEL, PLUG-IN

12 - 140 VAC
24 - 280 VAC

DESCRIPTION

AC output modules are used for controlling or switching AC loads. Each module provides up to 4000 V_{rms} of optical isolation between the field devices and the control logic. With the exception of the OAC5A5 module, all AC output modules are equivalent to a single pole, single throw, normally open contact (FORM A, SPST-NO, Make). The OAC5A5 is equivalent to a single pole, single throw, normally closed contact (FORM B, SPST-NC, Break). All AC output modules feature zero voltage turn-on and zero current turn-off.

Typical uses and applications for AC output modules include switching the following loads:

Relays
Solenoids And Contactors
Motor Starters
Heaters
Lamps Or Indicators

FEATURES

Industry standard plug-in module
4000 VAC optical isolation
Current rating: 3 amperes @ 45° C
Withstands one cycle surge of 80 amperes
UL recognized #E58169
CSA certified #35852
5, 15, and 24 VDC logic levels
Operating temperature: -30 to 70° C
Zero voltage turn-on
Zero current turn-off

ORDERING GUIDE

Line Voltage VAC	Logic Voltage	Part Number
12 - 140	5	OAC5
24 - 280	5	OAC5A
24 - 280 (Normally Closed, NC)	5	OAC5A5
12 - 140	15	OAC15
24 - 280	15	OAC15A
12 - 140	24	OAC24
24 - 280	24	OAC24A

NOTE: The OPTOMUX and PAMUX networks only use I/O modules with a 5 VDC logic voltage.

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

SPECIFICATIONS

GENERAL - Applies To All Models

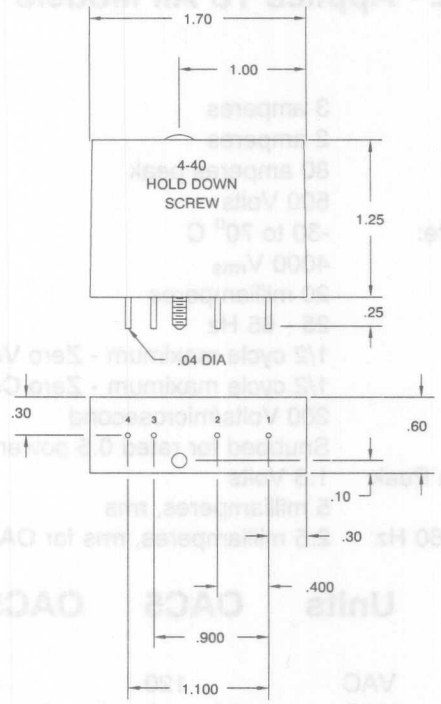
Current Rating:	
@ 45° C Ambient	3 amperes
@ 70° C Ambient	2 amperes
One Cycle Surge:	80 amperes peak
Peak Repetitive Voltage:	500 Volts
Operating Ambient Temperature:	-30 to 70° C
Isolation Input-To-Output:	4000 V_{rms}
Minimum Load Current:	20 milliamperes
Operating Frequency:	25 - 65 Hz
Turn-on Time:	1/2 cycle maximum - Zero Voltage
Turn-off Time:	1/2 cycle maximum - Zero Current
DV/DT - Off-state:	200 Volts/microsecond
DV/DT - Commutating:	Snubbed for rated 0.5 power factor load
Output Voltage Drop Maximum Peak:	1.6 Volts
Off-state Leakage:	5 milliamperes, rms
@ Norminal Voltage - 60 Hz	2.5 milliamperes, rms for OAC5A, OAC15A, and OAC24A @ 120 VAC

	Units	OAC5	OAC5A	OAC5A5 (NC)
Line Voltage - Nominal:	VAC	120	240	120/240
Operating Voltage Range:	VAC	12 - 140	24 - 280	24 - 280
Logic Voltage - Nominal:	VDC	5	5	5
Logic Voltage Range (V_{cc}):	VDC	2.5 - 8	2.5 - 8	2.5 - 8
Logic Pickup Voltage:	VDC	2.5	2.5	2.5
Logic Dropout Voltage:	VDC	1	1	1
Logic Input Current: @ Normal Logic Voltage (I_{out} in Schematic Diagram)	mA	12	12	12
Control Resistance: (R_c in Schematic Diagram)	Ohms	220	220	220

	Units	OAC15	OAC15A	OAC24	OAC24A
Line Voltage - Nominal:	VAC	120	240	120	240
Operating Voltage Range:	VAC	12 - 140	24 - 280	12 - 140	24 - 280
Logic Voltage - Nominal:	VDC	15	15	24	24
Logic Voltage Range (V_{cc}):	VDC	9 - 16	9 - 16	18 - 32	18 - 32
Logic Pickup Voltage:	VDC	9	9	18	18
Logic Dropout Voltage:	VDC	1	1	1	1
Logic Input Current: @ Nominal Logic Voltage* (I_{out} in Schematic Diagram)	mA	15	15	18	18
Control Resistance: (R_c in Schematic Diagram)	Ohms	1k	1k	2.2k	2.2k

* When plugged into an Opto 22 I/O mounting rack.

DIMENSIONS



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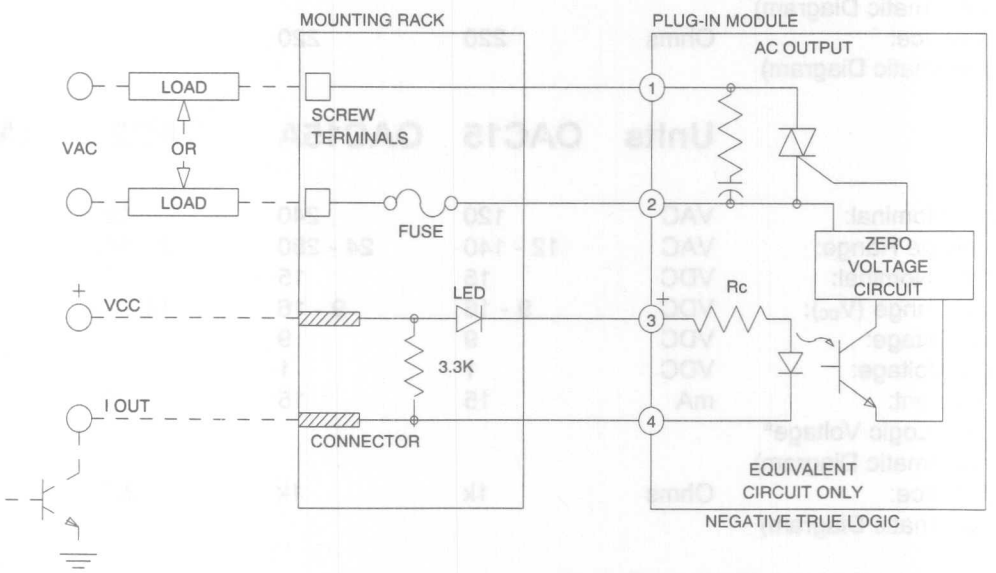
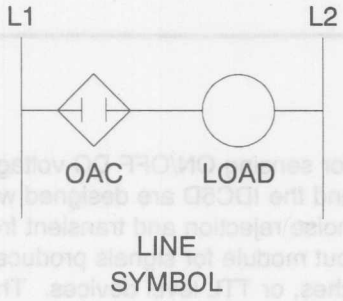
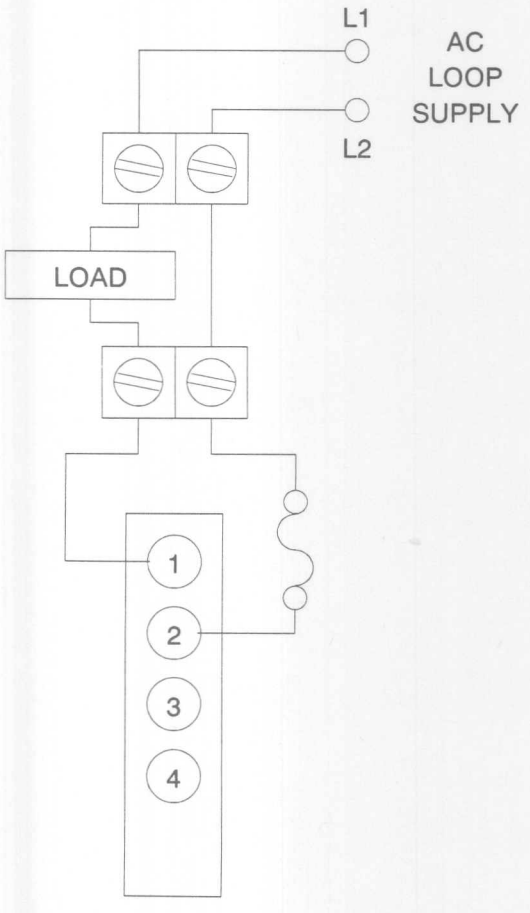


Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

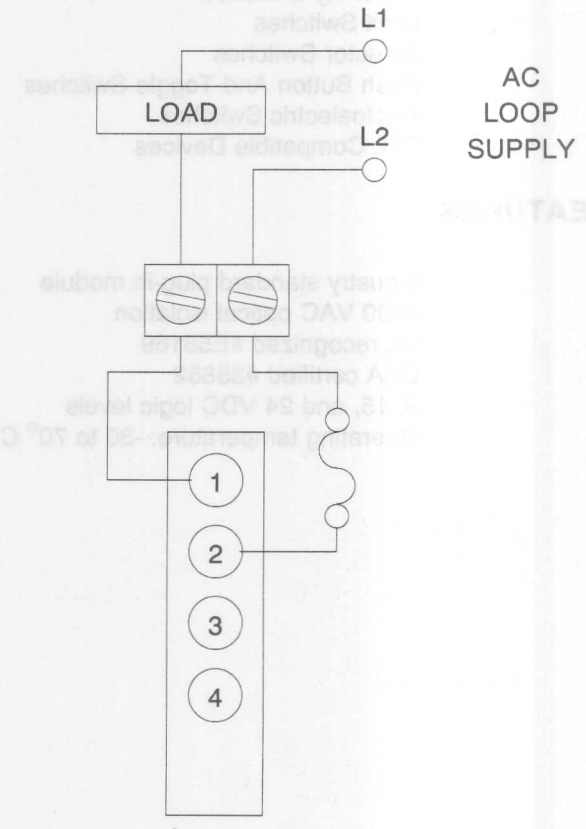
WIRING



LINE SYMBOL



OAC USING RACKS WITH EXTRA TERMINAL STRIP



OAC USING STANDARD MOUNTING RACK

DC INPUT MODULES
SINGLE CHANNEL, PLUG-IN

4 - 16 VDC
2.5 - 28 VDC
10 - 32 VDC
35 - 60 VDC
90 - 140 VDC
180 - 280 VDC

DESCRIPTION

DC input modules are used for sensing ON/OFF DC voltage levels. All DC input modules with the exception of the IDC5B and the IDC5D are designed with filtering on the input and a hysteresis amplifier for high noise rejection and transient free "clean" switching. The IDC5B module is a fast switching input module for signals produced by photoelectric switches, encoders, DC proximity switches, or TTL level devices. The IDC5D is a low cost, DC only, input module for use in data acquisition applications. Each module provides up to 4000 V_{rms} of optical isolation between the field inputs and the logic side of the circuit.

Typical uses and applications include sensing the presence or absence of voltage or sensing contact closures from sources such as:

Proximity Switches
Limit Switches
Selector Switches
Push Button And Toggle Switches
Photoelectric Switches
TTL Compatible Devices

FEATURES

Industry standard plug-in module
4000 VAC optical isolation
UL recognized #E58169
CSA certified #35852
5, 15, and 24 VDC logic levels
Operating temperature: -30 to 70° C

Opto 22
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DC INPUT MODULES
SINGLE CHANNEL, PLUG-IN

4 - 16 VDC
2.5 - 28 VDC
10 - 32 VDC
35 - 60 VDC
90 - 140 VDC
180 - 280 VDC

ORDERING GUIDE

Input Voltage VDC	Logic Voltage	Part Number
10 - 32	5	IDC5
4 - 16	5	IDC5B
2.5 - 28	5	IDC5D
35 - 60	5	IDC5G
90 - 140	5	IAC5
180 - 280	5	IAC5A
10 - 32	15	IDC15
90 - 140	15	IAC15
180 - 280	15	IAC15A
10 - 32	24	IDC24
90 - 140	24	IAC24

NOTE: The OPTOMUX and PAMUX networks only use modules with a 5 VDC logic voltage.

SPECIFICATIONS

GENERAL - Applies To All Models

Operating Ambient Temperature:	-30 to 70° C
Isolation Input-To-Output:	4000 V_{rms}
Output Voltage Drop:	0.4 Volts @ 50 milliamperes
Output Current:	50 milliamperes
Output Leakage With No Input:	100 microamperes maximum @ 30 VDC 10 microamperes maximum @ 30 VDC for IDC5D
Transistor:	30 Volts breakdown

SPECIFICATIONS (Continued)

	Units	IDC5	IDC5B	IDC5D	IDC5G	IDC15	IDC24
Input Voltage Range:	VDC	10 - 32	4 - 16	2.5 - 28	35 - 60	10 - 32	10 - 32
Input Current @ Maximum Line:	mA	25	45	30	6	25	25
Turn-on Time:	msec	5	0.05	1	10	5	5
Turn-off Time:	msec	5	0.1	1.5	10	5	5
Input Allowed For No Output:	mA, V	1, 3	0.7, 1	0.2, 1	0.8, 9	1, 3	1, 3
Logic Supply Voltage - Nominal:	VDC	5	5	5	5	15	24
Logic Supply Voltage Range:	VDC	4.5 - 6	4.5 - 6	4.5 - 6	4.5 - 6	12 - 18	20 - 30
Logic Supply Current: @ Nominal Logic Voltage*	mA	12	12	12	12	15	18
Input Resistance: (R1 in Schematic Diagram)	Ohms	1k	300	900	10k	1k	1k
Control Resistance: (Rc in Schematic Diagram)	Ohms	220	220	470	220	1k	2.2k

	Units	IAC5	IAC15	IAC24	IAC5A	IAC5A
Input Voltage Range:	VDC	90 - 140	90 - 140	90 - 140	180 - 280	180 - 280
Input Current @ Maximum Line:	mA	11	11	11	6.5	6.5
Turn-on Time:	msec	20	20	20	20	20
Turn-off Time:	msec	20	20	20	20	20
Input Allowed For No Output:	mA, V	3, 45	3, 45	3, 45	1.7, 80	1.7, 80
Logic Supply Voltage - Nominal:	VDC	5	15	24	5	15
Logic Supply Voltage Range:	VDC	4.5 - 6	12 - 18	20 - 30	4.5 - 6	12 - 18
Logic Supply Current: Nominal Logic Voltage*	mA	12	15	18	12	15
Input Resistance: (R1 in Schematic Diagram)	Ohms	14k	14k	14k	43k	43k
Control Resistance: (Rc in Schematic Diagram)	Ohms	220	1k	2.2k	220	1k

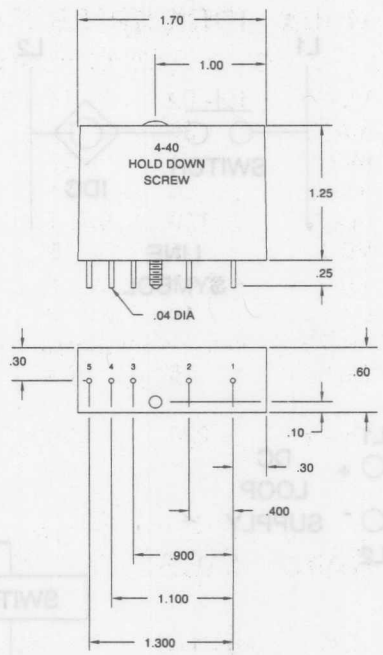
* When plugged into an Opto 22 I/O mounting rack.

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

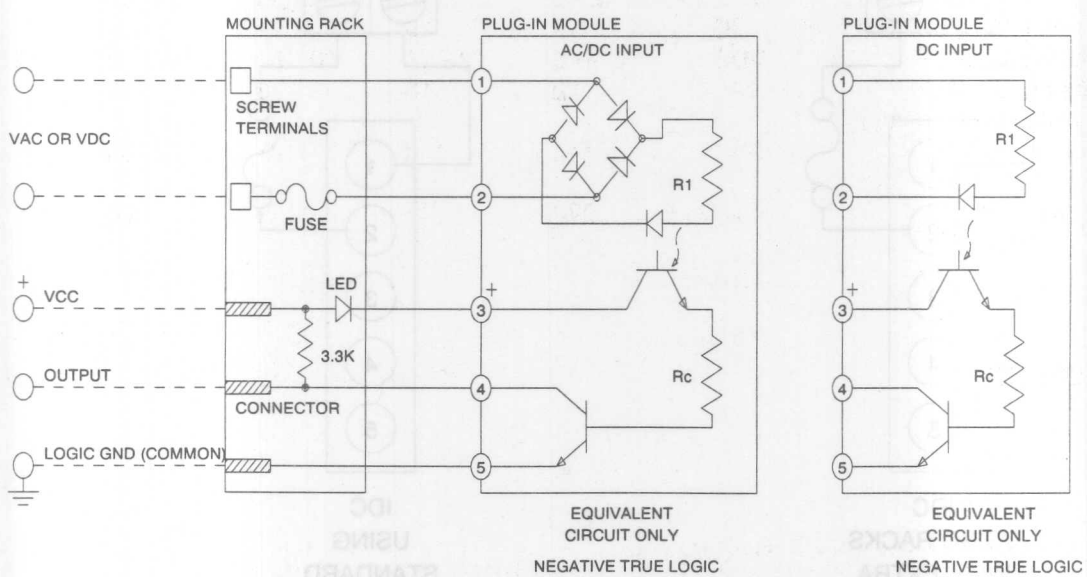
DC INPUT MODULES
SINGLE CHANNEL, PLUG-IN

4 - 16 VDC
2.5 - 28 VDC
10 - 32 VDC
35 - 60 VDC
90 - 140 VDC
180 - 280 VDC

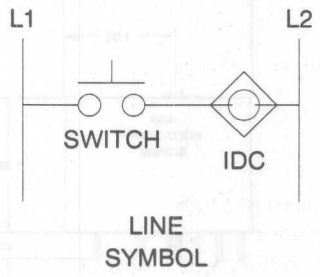
DIMENSIONS



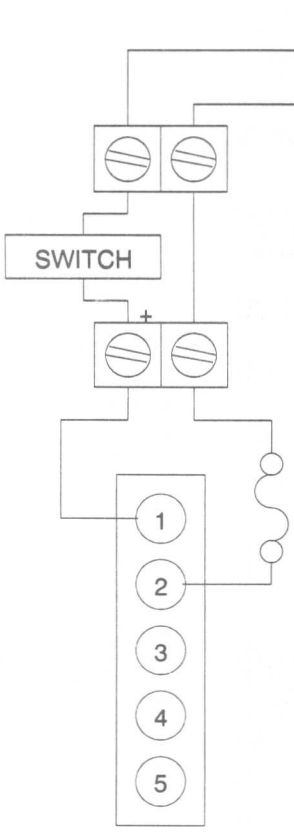
SCHEMATIC



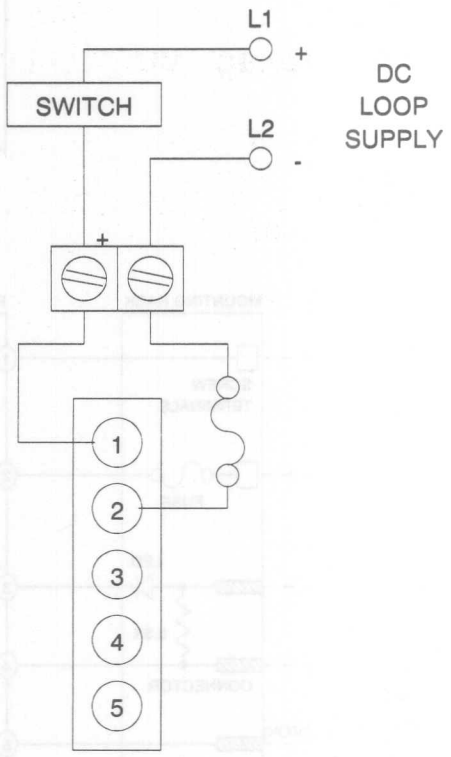
WIRING



LINE
SYMBOL



IDC
USING RACKS
WITH EXTRA
TERMINAL STRIP



IDC
USING
STANDARD
MOUNTING RACK

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

DC OUTPUT MODULES — 5 - 60 VDC
SINGLE CHANNEL, PLUG-IN — 5 - 200 VDC

DESCRIPTION

DC output modules are used for controlling or switching DC loads. Each module provides up to 4000 V_{rms} of optical isolation between the field devices and the control logic.

Typical uses and applications for DC output modules include switching the following loads:

- DC Relays
- DC Solenoids
- DC Motor Starters
- DC Lamps Or Indicators

FEATURES

- Industry standard plug-in module
- 4000 VAC optical isolation
- Withstands one second surge at 5 amperes
- UL recognized #E58169
- CSA certified #35852
- 5, 15, and 24 VDC logic levels
- Operating temperature: -30 to 70° C

ORDERING GUIDE

Line Voltage VDC	Logic Voltage	Part Number
5 - 60	5	ODC5
5 - 200	5	ODC5A
5 - 60	15	ODC15
5 - 60	24	ODC24

NOTE: The OPTOMUX and PAMUX networks only use modules with a 5 VDC logic voltage.

SPECIFICATIONS

GENERAL - Applies To All Models

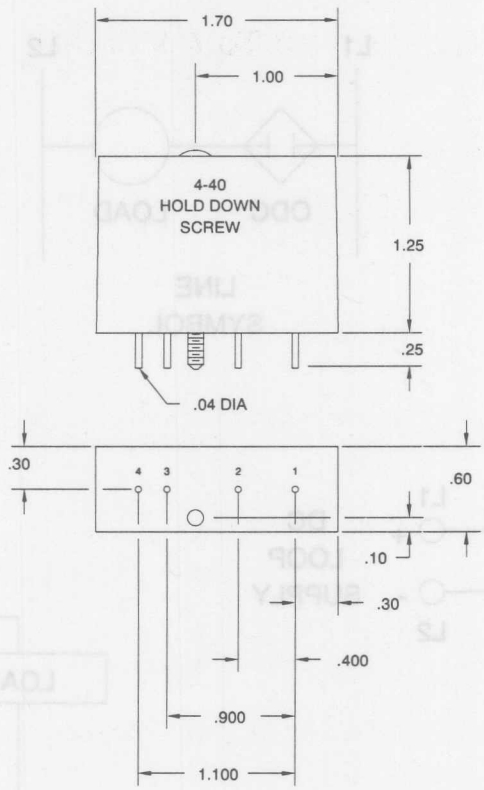
One Second Surge:	5 amperes
Operating Ambient Temperature:	-30 to 70° C
Isolation Input-To-Output:	4000 V_{rms}
Turn-on Time:	100 microseconds
Turn-off Time:	750 microseconds
Output Voltage Drop Maximum:	1.6 Volts

	Units	ODC5	ODC5A	ODC15	ODC24
Line Voltage - Maximum:	VDC	60	200	60	60
Operating Voltage Range:	VDC	5 - 60	5 - 200	5 - 60	5 - 60
Current Rating:					
@ 45° C Ambient	Amps	3	1	3	3
@ 70° C Ambient	Amps	2	0.55	2	2
Off-state Leakage:	mA	1	2	1	1
@ Maximum Voltage					
Logic Voltage - Nominal:	VDC	5	5	15	24
Logic Voltage Range (V_{cc}):	VDC	2.5 - 8	2.5 - 8	9 - 16	18 - 32
Logic Pickup Voltage:	VDC	2.5	2.5	9	18
Logic Dropout Voltage:	VDC	1	1	1	1
Logic Input Current:	mA	12	12	15	18
@ Nominal Logic Voltage*					
Control Resistance:	Ohms	220	220	1k	2.2k
(R_c in Schematic Diagram)					

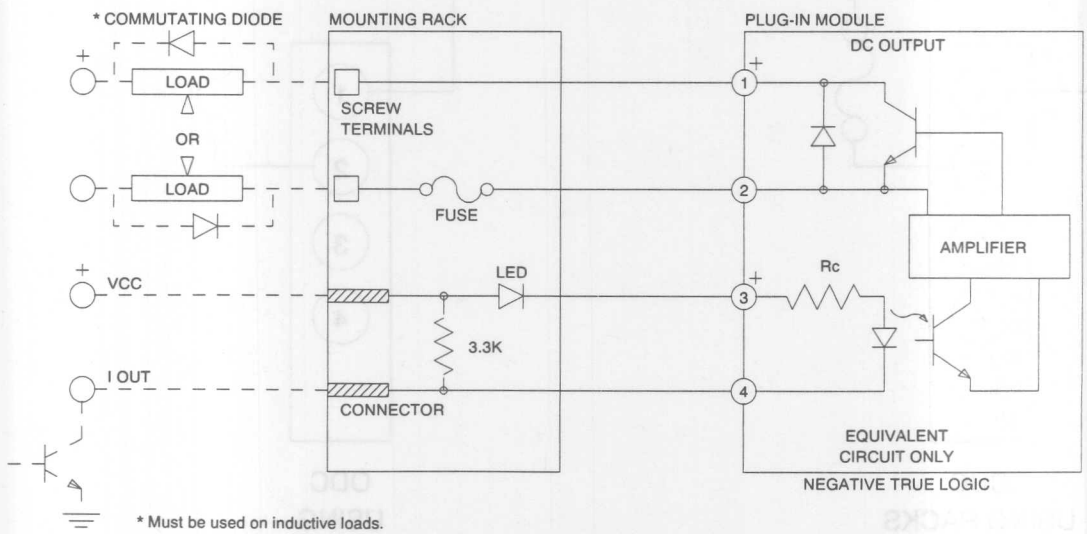
* When plugged into an Opto 22 I/O mounting rack.

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

DIMENSIONS



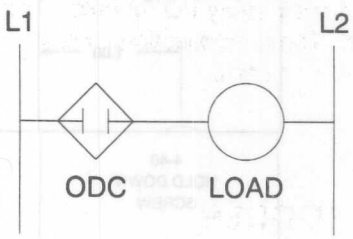
SCHEMATIC



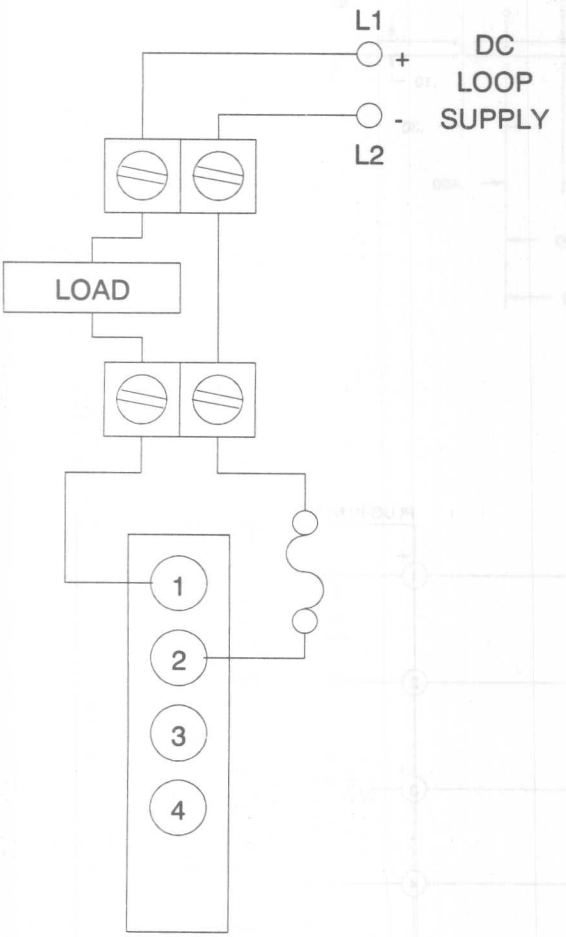
* Must be used on inductive loads.

Note: Also compatible with Totem Pole or 3-State Output.

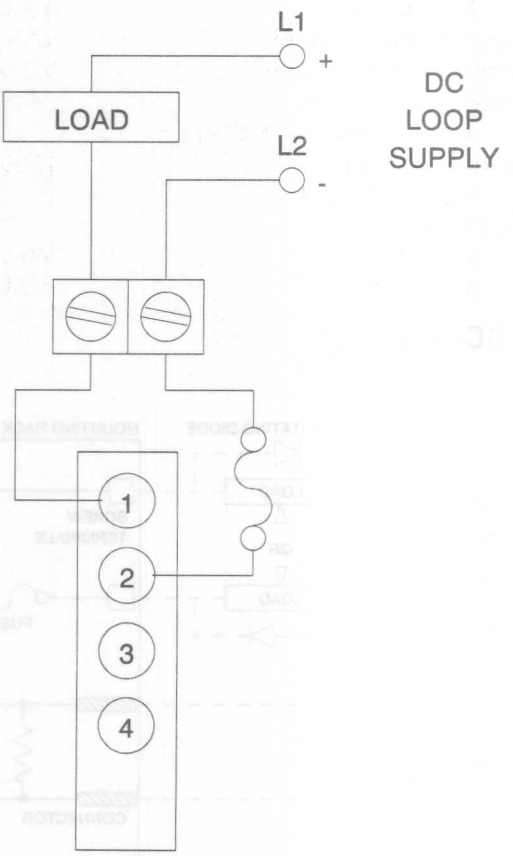
WIRING



LINE
SYMBOL



ODC
USING RACKS
WITH EXTRA
TERMINAL STRIP



ODC
USING
STANDARD
MOUNTING RACK

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

DRY CONTACT OUTPUT MODULE SINGLE CHANNEL, PLUG-IN

ODC5R

DESCRIPTION

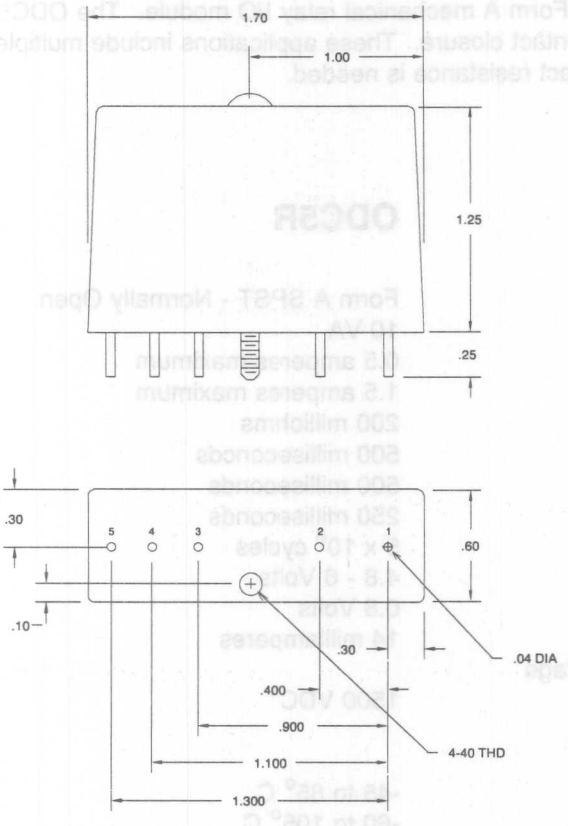
The ODC5R is a Form A mechanical relay I/O module. The ODC5R is ideal for applications requiring a dry-contact closure. These applications include multiplexing of communication lines where a low-contact resistance is needed.

SPECIFICATIONS

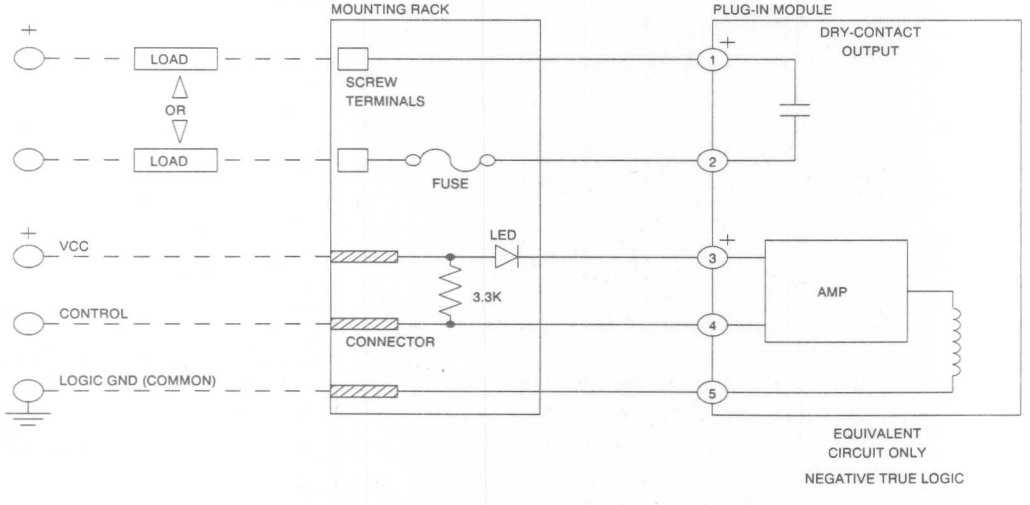
	ODC5R
Contact Form:	Form A SPST - Normally Open
Contact Rating:	10 VA
Switching Volts:	0.5 amperes maximum
Carry Current:	1.5 amperes maximum
Contact On - Resistance:	200 milliohms
Turn-on Time:	500 milliseconcds
Turn-off Time:	500 milliseconds
Contact Bounce:	250 milliseconds
Mechanical Life:	5×10^6 cycles
Logic Pickup Voltage*:	4.8 - 6 Volts
Logic Dropout Voltage:	0.8 Volts
Logic Input Current: @ Nominal Logic Voltage	14 milliamperes
Isolation Voltage: Input-To-Output	1500 VDC
Temperature:	
Operating	-45 to 85° C
Storage	-60 to 105° C

* When plugged into an Opto 22 I/O mounting rack using 5 VDC Logic Voltage.

DIMENSIONS

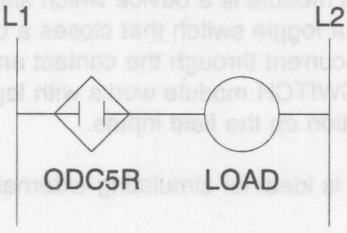


SCHEMATIC

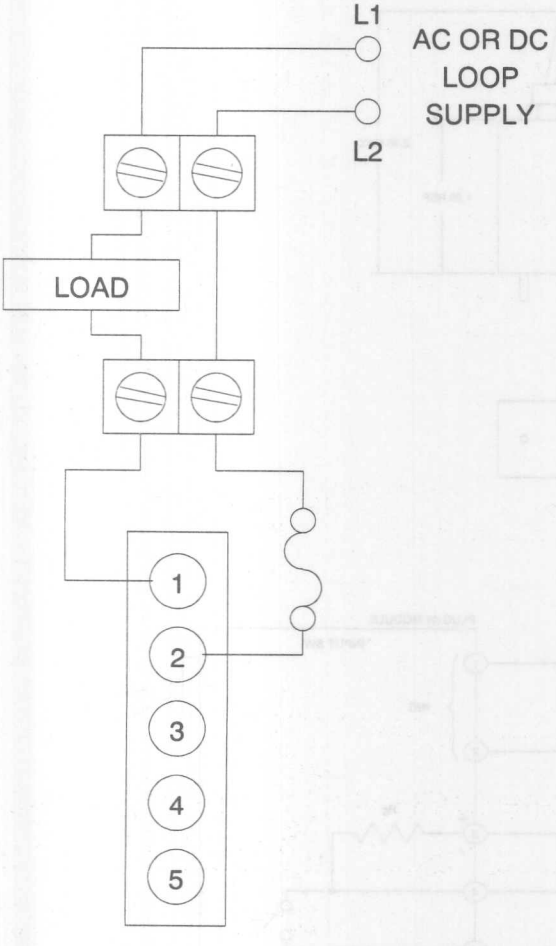


Note: Also compatible with Totem Pole or 3-State Output.
Will not plug-in to PB4R mounting rack.

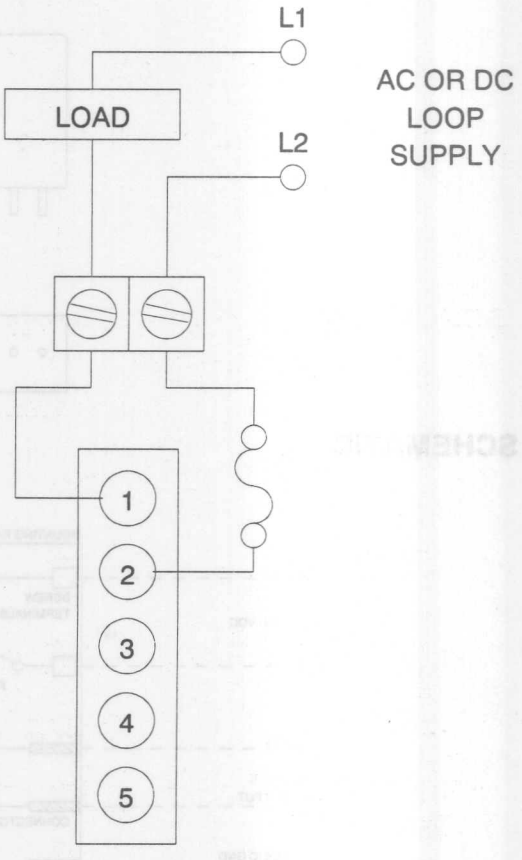
WIRING



LINE
SYMBOL



ODC5R
USING RACKS
WITH EXTRA
TERMINAL STRIP



ODC5R
USING
STANDARD
MOUNTING RACK

INPUT TEST MODULE
SINGLE CHANNEL, PLUG-IN

DESCRIPTION

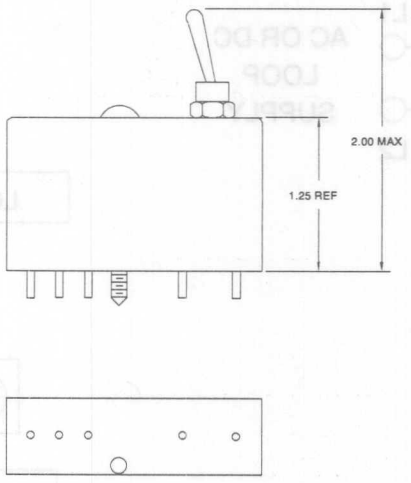
The Opto 22 INPUT SWITCH module is a device which simulates an input on an I/O mounting rack. Each module contains a toggle switch that closes a contact on a logic side of the module. An internal resistor limits the current through the contact and provides a load similar to an actual module. The INPUT SWITCH module works with logic voltages of 5, 15, and 24 volts. Internally, there is no connection on the field inputs.

The INPUT SWITCH module is ideal for simulating external discrete events in order to test the application software.

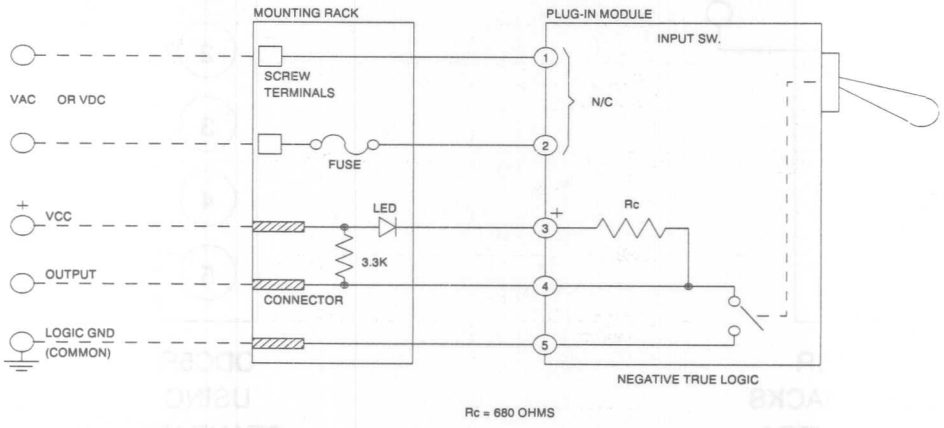
ORDERING GUIDE

Part Number: INPUT SWITCH

DIMENSIONS



SCHEMATIC



Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

OUTPUT TEST MODULE
SINGLE CHANNEL, PLUG-IN

OUTPUT SWITCH

DESCRIPTION

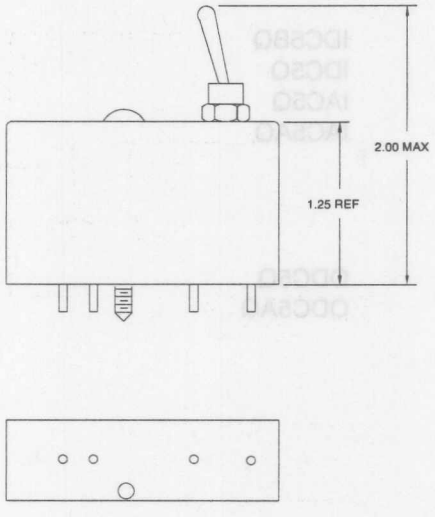
The Opto 22 OUTPUT SWITCH module is a device which provides a dummy load on the logic side of the module and a manual toggle switch on the field side. The toggle switch closes a contact which shorts the field terminals to turn on a field output. Internally, the field and logic circuitry are independent.

The OUTPUT SWITCH module is ideal for testing field wiring and devices by simulating an output from the computer.

ORDERING GUIDE

Part Number: OUTPUT SWITCH

DIMENSIONS



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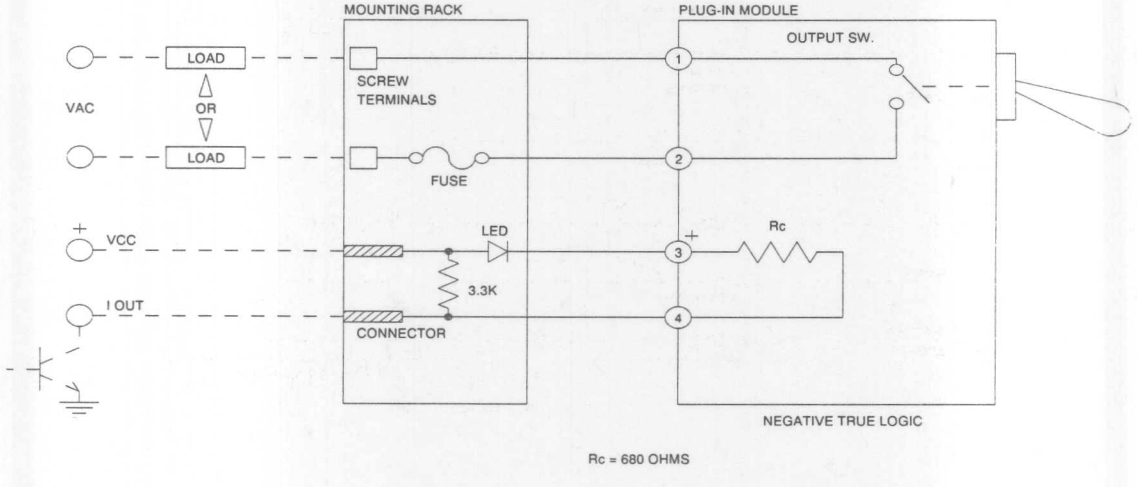


Rc = 680 OHMS

5 Volt Logic Voltage Only

AC INPUT

12 - 32 VAC	IDC5Q
90 - 140 VAC	IAC5Q
180 - 280 VAC	IAC5AQ

AC OUTPUT

12 - 280 VAC	OAC5Q

DC INPUT

4 - 16 VDC	IDC5BQ
10 - 32 VDC	IDC5Q
90 - 140 VDC	IAC5Q
180 - 280 VDC	IAC5AQ

DC OUTPUT

5 - 60 VDC	ODC5Q
5 - 200 VDC	ODC5AQ

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

AC INPUT MODULES
QUAD PAK, PLUG-IN

12 - 32 VAC
90 - 140 VAC
180 - 280 VAC

DESCRIPTION

Quad Pak modules contain the equivalent of four, single channel circuits in a high-density package. Each Quad Pak module can be divided into two pairs with each pair sharing a common line. The Quad Pak modules are designed to plug into the high-density I/O mounting racks only and cannot be plugged into single channel racks. Quad Pak modules are only designed to work with a 5 VDC logic voltage and can be used with the OPTOMUX or PAMUX networks.

AC input modules are used for sensing ON/OFF alternating current (AC) voltage levels. All AC input modules are designed with filtering on the input and a hysteresis amplifier for high noise rejection and transient free "clean" switching. Each module provides up to 4000 V_{rms} of optical isolation between field inputs and the logic side of the circuit.

Typical uses and applications include sensing the presence or absence of voltage or sensing contact closures from sources such as:

Proximity Switches
Limit Switches
Selector Switches
Push Button And Toggle Switches
Thermostats

FEATURES

Industry standard plug-in modules
4000 VAC optical isolation
UL recognized #E58169
CSA certified #35852
Operating temperature: -30 to 70° C
Built-in filtering for transient suppression and noise rejection

ORDERING GUIDE

Input Voltage VAC	Logic Voltage	Part Number
12 - 32	5	IDC5Q
90 - 140	5	IAC5Q
180 - 280	5	IAC5AQ

SPECIFICATIONS

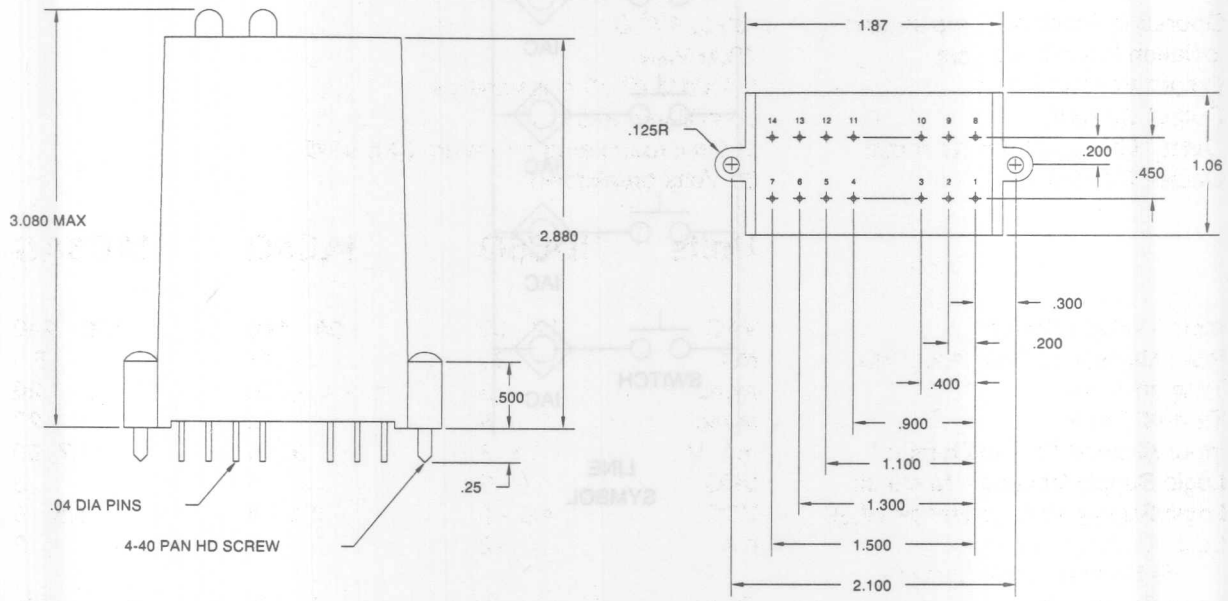
GENERAL - Applies To All Models

Operating Ambient Temperature: -30 to 70° C
Isolation Input-To-Output: 4000 V_{rms}
Output Voltage Drop: 0.4 Volts @ 50 milliamperes
Output Current: 50 milliamperes
Output Leakage With No Input: 100 microamperes maximum @ 5 VDC
Output Transistor: 30 Volts breakdown

	Units	IDC5Q	IAC5Q	IAC5AQ
Input Voltage Range:	VAC	12 - 32	90 - 140	180 - 280
Input Current @ Maximum Line:	mA	29	11	6.5
Turn-on Time:	msec	5	20	20
Turn-off Time:	msec	5	20	20
Input Allowed For No Output:	mA, V	1, 3	3, 45	1.7, 80
Logic Supply Voltage - Nominal:	VDC	5	5	5
Logic Supply Voltage Range (V_{cc}):	VDC	4.5 - 6	4.5 - 6	4.5 - 6
Logic Supply Current: @ Nominal Logic Voltage	mA	12	12	12
Input Resistance: (R1 in Schematic Diagram)	Ohms	1.5k	14k	43k
Control Resistance: (Rc in Schematic Diagram)	Ohms	220	220	220

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

DIMENSIONS



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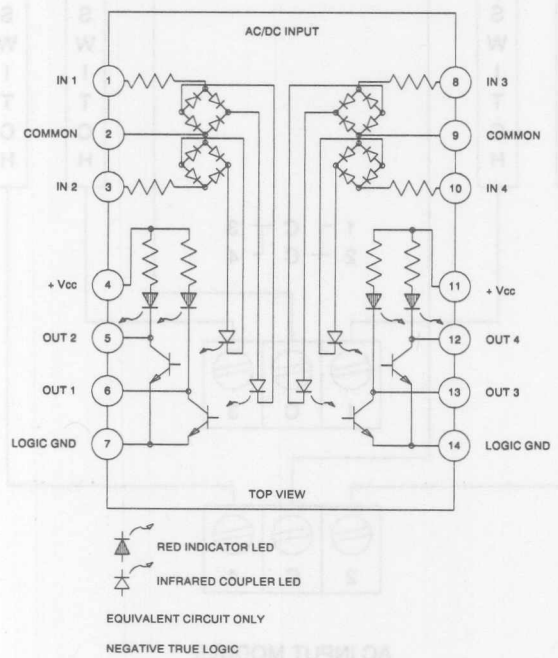
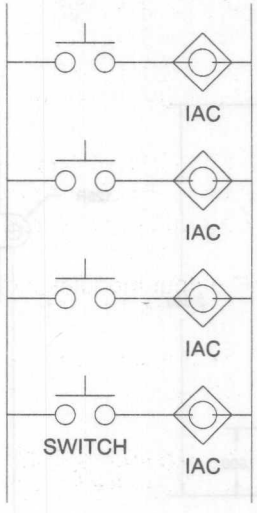
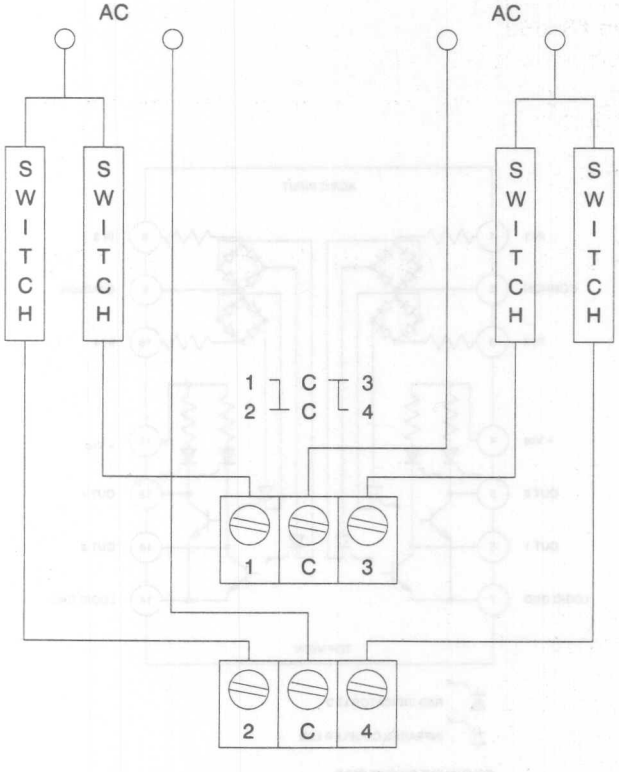


WIRING



LINE
SYMBOL



AC INPUT MODULE

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

DESCRIPTION

Quad Pak modules contain the equivalent of four, single channel circuits in a high-density package. Each Quad Pak module can be divided into two pairs with each pair sharing a common line. The Quad Pak modules are designed to plug into high-density mounting racks only and cannot be plugged into single channel racks. Quad Pak modules are only designed to work with a 5 VDC logic voltage and can be used with the OPTOMUX or PAMUX networks.

AC input modules are used for controlling or switching AC loads. Each module provides up to 4000 V_{rms} of optical isolation between the field devices and the control logic. The Quad Pak AC output module features zero voltage turn-on and zero current turn-off.

Typical uses and applications for AC output modules include switching the following loads:

Relays
Solenoids And Contactors
Motor Starters
Heaters
Lamps Or Indicators

FEATURES

Industry standard plug-in modules
4000 VAC optical isolation
Withstands one cycle surge of 80 amperes
UL recognized #E58169
CSA certified #35852
Operating temperature: -30 to 70° C
Zero voltage turn-on
Zero current turn-off

ORDERING GUIDE

Input Voltage VAC	Logic Voltage	Part Number
12 - 280	5	OAC5Q

SPECIFICATIONS

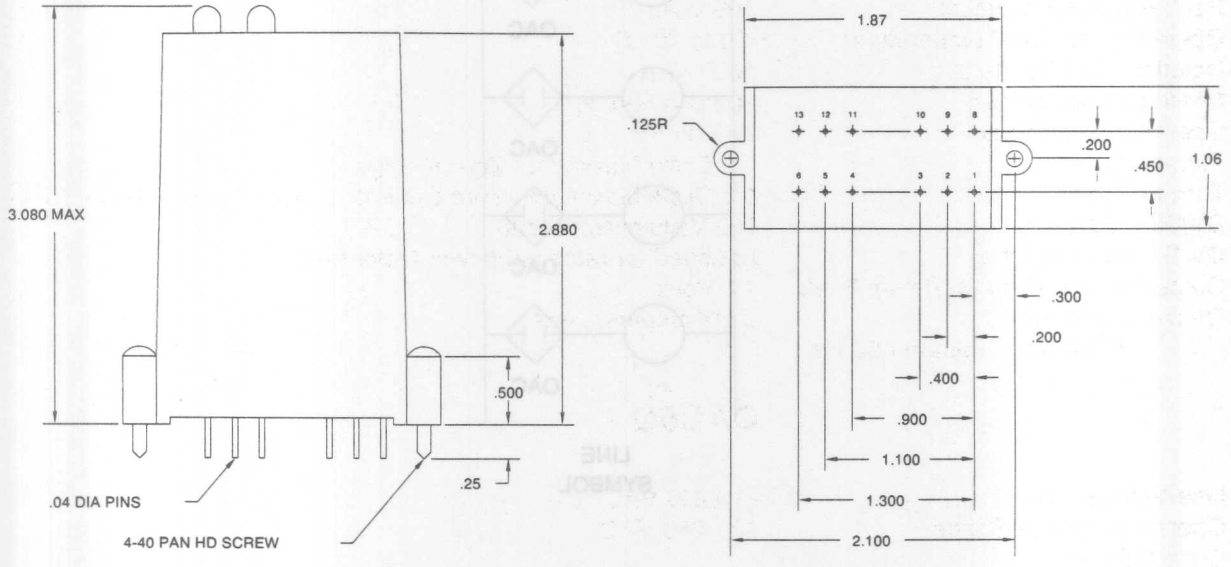
GENERAL - Applies To All Models

Peak Repetitive Voltage:	500 Volts
Operating Ambient Temperature:	-30 to 70° C
Isolation Input-To-Output:	4000 V_{rms}
Minimum Load Current:	20 milliamperes
Operating Frequency:	25 - 65 Hz
Turn-on Time:	1/2 Cycle Maximum - Zero Voltage
Turn-off Time:	1/2 Cycle Maximum - Zero Current
DV/DT - Off-state	200 Volts/microsecond
DV/DT - Commutating	Snubbed for rated 0.5 power factor load
Output Voltage Drop Maximum Peak:	1.6 Volts
Off-state Leakage: @ Nominal Voltage - 60 Hz	5 milliamperes, rms

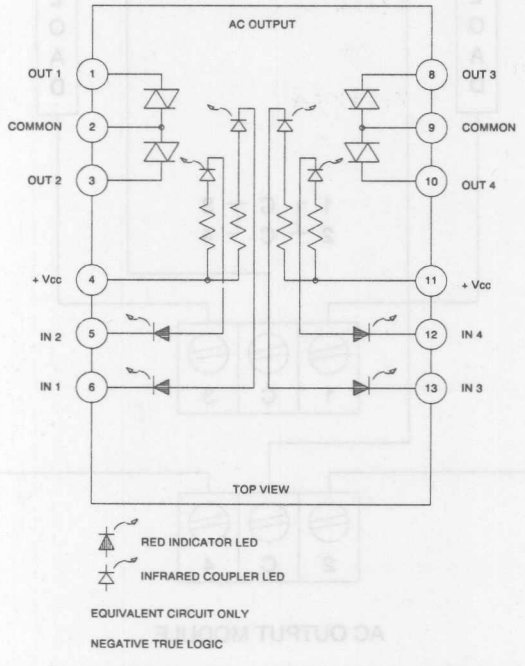
OAC5Q

Line Voltage - Nominal:	120/240 VAC
Operating Voltage Range:	12 - 280 VAC
Current Rating:	
@ 20° C Ambient	3 Amps
@ 45° C Ambient	2 Amps
One Cycle Surge:	80 Amps
Logic Voltage - Nominal:	5 VDC
Logic Voltage Range (V_{cc}):	4 - 8 VDC
Logic Pickup Voltage:	4.0 VDC
Logic Dropout Voltage:	2.3 VDC
Logic Input Current: @ Nominal Logic Voltage (I_{out} in Schematic Diagram)	12 mA
Control Resistance: (Rc in Schematic Diagram)	220 Ohms

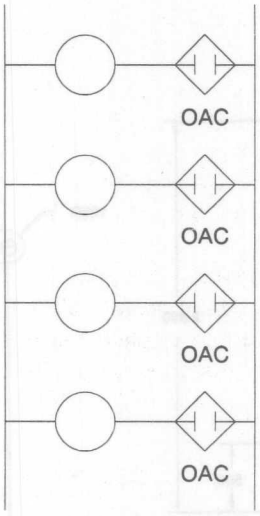
DIMENSIONS



SCHEMATIC



WIRING



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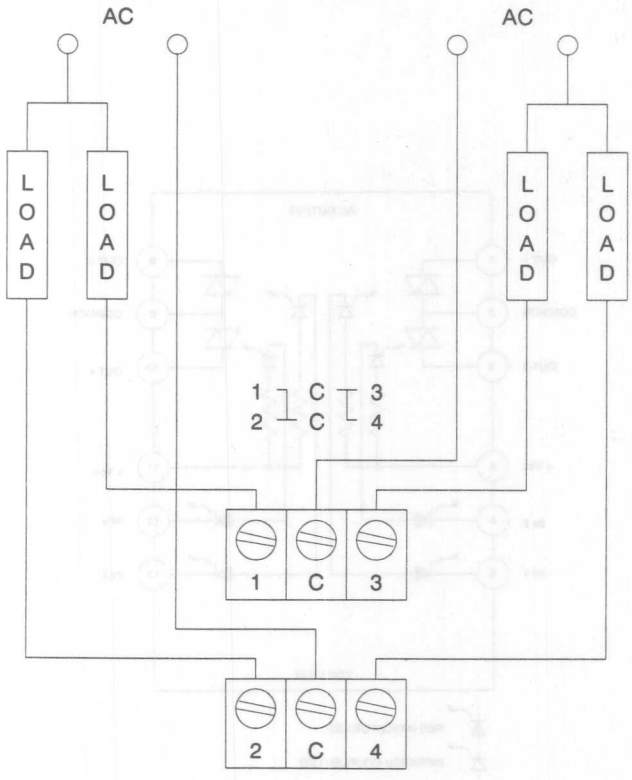
SYMBOL



AC OUTPUT MODULE

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

DC INPUT MODULES
QUAD PAK, PLUG-IN

4 - 16 VDC
10 - 32 VDC
90 - 140 VDC
180 - 280 VDC

DESCRIPTION

Quad Pak modules contain the equivalent of four, single channel circuits in a high-density package. Each Quad Pak module can be divided into two pairs with each pair sharing a common line. The Quad Pak modules are designed to plug into high-density mounting racks only and cannot be plugged into single channel racks. Quad Pak modules are only designed to work with a 5 VDC logic voltage and can be used with the OPTOMUX and PAMUX networks.

DC input modules are used for sensing ON/OFF DC voltage levels. All DC input modules, with the exception of the IDC5BQ, are designed with filtering on the input and a hysteresis amplifier for high noise rejection and transient free "clean" switching. The IDC5BQ module is a fast switching input module for signals produced by photoelectric switches, encoders, DC proximity switches, or TTL devices. Each module provides up to 4000 V_{rms} of optical isolation between field inputs and the logic side of the circuit.

Typical uses and applications include sensing the presence or absence of voltage or sensing contact closures from sources such as:

Proximity Switches
Limit Switches
Selector Switches
Push Button And Toggle Switches
Photoelectric Switches
TTL Compatible Devices

FEATURES

Industry standard plug-in modules
4000 VAC optical isolation
UL recognized #E58169
CSA certified #35852
Operating temperature: -30 to 70° C

ORDERING GUIDE

Input Voltage VDC	Logic Voltage	Part Number
10 - 32	5	IDC5Q
4 - 16	5	IDC5BQ
90 - 140	5	IAC5AQ

SPECIFICATIONS

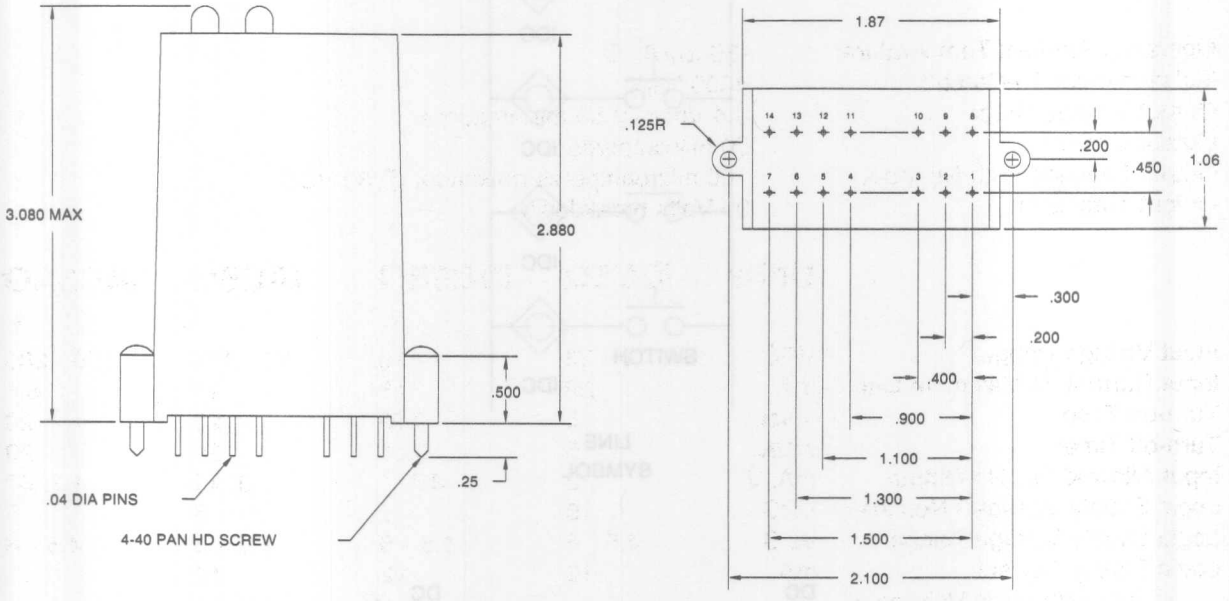
GENERAL - Applies To All Models

Operating Ambient Temperature: -30 to 70° C
Isolation Input-To-Output: 4000 V_{rms}
Output Voltage Drop: 0.4 Volts @ 50 milliamperes
Output Current: 50 milliamperes
Output Leakage With No Input: 100 microamperes maximum @ 30 VDC
Output Transistor: 30 Volts breakdown

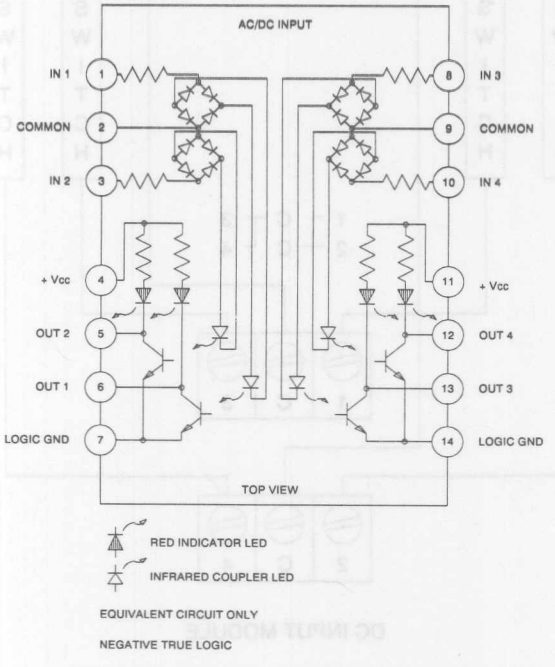
	Units	IDC5Q	IDC5BQ	IAC5Q	IAC5AQ
Input Voltage Range:	VDC	10 - 32	4 - 16	90 - 140	180 - 280
Input Current @ Maximum Line:	mA	29	45	11	6.5
Turn-on Time:	msec	5	0.05	20	20
Turn-off Time:	msec	5	0.01	20	20
Input Allowed For No Output:	mA, V	1, 3	0.7, 1	3, 45	1.7, 80
Logic Supply Voltage - Nominal:	VDC	5	5	5	5
Logic Supply Voltage Range:	VDC	4.5 - 6	4.5 - 6	4.5 - 6	4.5 - 6
Logic Supply Current: @ Nominal Logic Voltage	mA	12	12	12	12
Input Resistance: (R1 in Schematic Diagram)	Ohms	1.5k	300k	14k	43k
Control Resistance: (Rc in Schematic Diagram)	Ohms	220	220	220	220

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

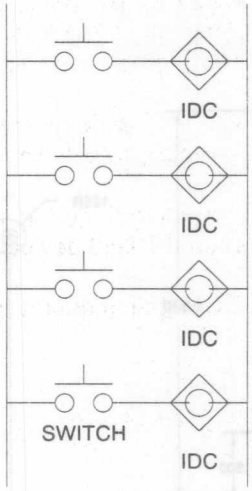
DIMENSIONS



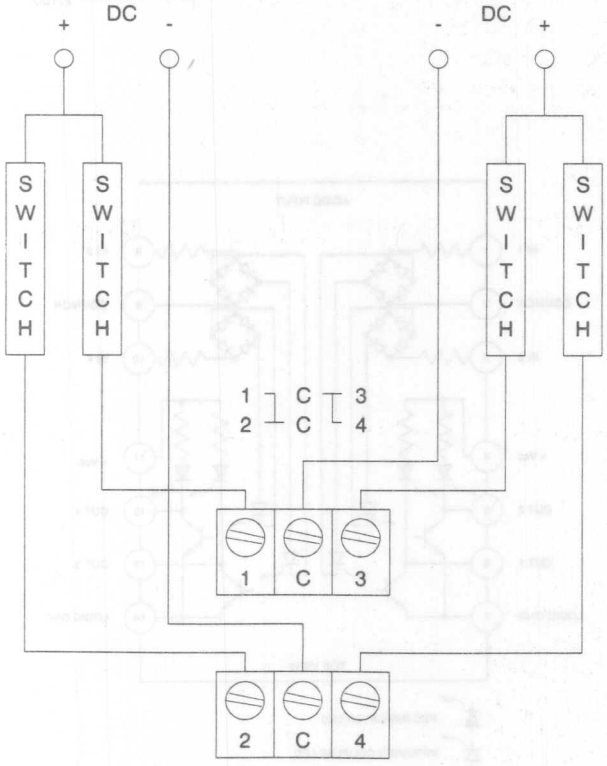
SCHEMATIC



WIRING



LINE
SYMBOL



DC INPUT MODULE

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

DC OUTPUT MODULES
QUAD PAK, PLUG-IN

5 - 60 VDC
5 - 200 VDC

DESCRIPTION

Quad Pak modules contain the equivalent of four, single channel circuits in a high-density package. Each Quad Pak module can be divided into two pairs with each pair sharing a common line. The Quad Pak modules are designed to plug into high-density mounting racks only and cannot be plugged into single channel racks. Quad Pak modules are only designed to work with a 5 VDC logic voltage and can be used with the OPTOMUX and PAMUX networks.

DC input modules are used for controlling or switching DC loads. Each module provides up to 4000 V_{rms} of optical isolation between the field devices and the control logic.

DC output modules are used for controlling or switching DC loads. Each module provides up to 4000 V_{rms} of optical isolation between the field devices and the control logic.

Typical uses and applications for DC output modules include switching the following loads:

DC Relays
DC Solenoids
DC Motor Starters
DC Lamps Or Indicators

FEATURES

Industry standard plug-in module
4000 VAC optical isolation
Withstands one second surge of 5 amperes
UL recognized #E58169
CSA certified #35852
Operating temperature: -30 to 70° C

ORDERING GUIDE

Line Voltage VDC	Logic Voltage	Part Number
5 - 60	5	ODC5Q
5 - 200	5	ODC5AQ

SPECIFICATIONS

	Units	ODC5Q	ODC5AQ
Line Voltage - Maximum:	VDC	60	200
Operating Vaoltage Range:	VDC	5 - 60	5 - 200
Current Rating:			
@ 20° C Ambient	Amps	3	1
@ 45° C Ambient	Amps	2	1
@ 70° C Ambient	Amps	1	0.55
Off-state Leakage @ Maximum Voltage:	mA	1	2
Logic Voltage - Nominal:	VDC	5	5
Logic Voltage Range (V_{cc}):	VDC	4 - 8	4 - 8
Logic Pickup Voltage:	VDC	4.0	4.0
Logic Dropout Voltage:	VDC	2.3	2.3
Logic Input Current:	mA	12	12
@ Nominal Logic Voltage (I_{out} in Schematic Diagram)			
Control Resistance: (R_C in Schematic Diagram)	Ohms	220	220
One Second Surge:	Amps	5	5
Operating Ambient Temperature:	Degrees C	-30 to 70	-30 to 70
Isolation Input-To-Output:	V_{rms}	4000	4000
Turn-on Time:	Microseconds	100	100
Turn-off Time:	Microseconds	750	750
Output Voltage Drop Maximum:	Volts	1.6	1.6

Opto 22
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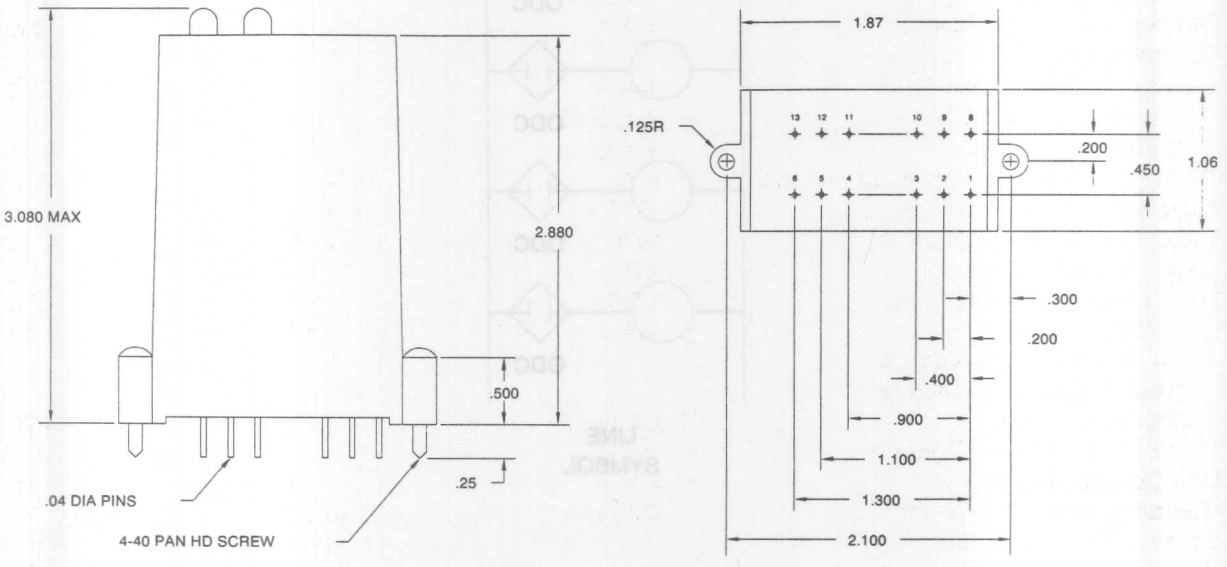
DIMENSIONS



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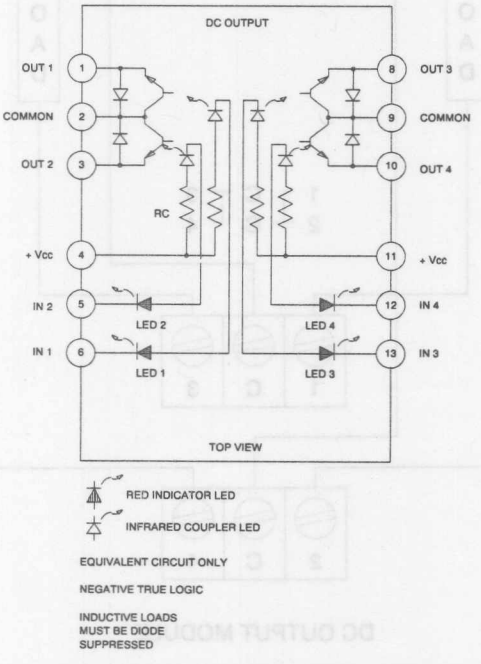
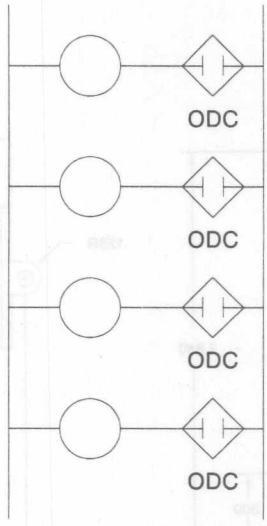
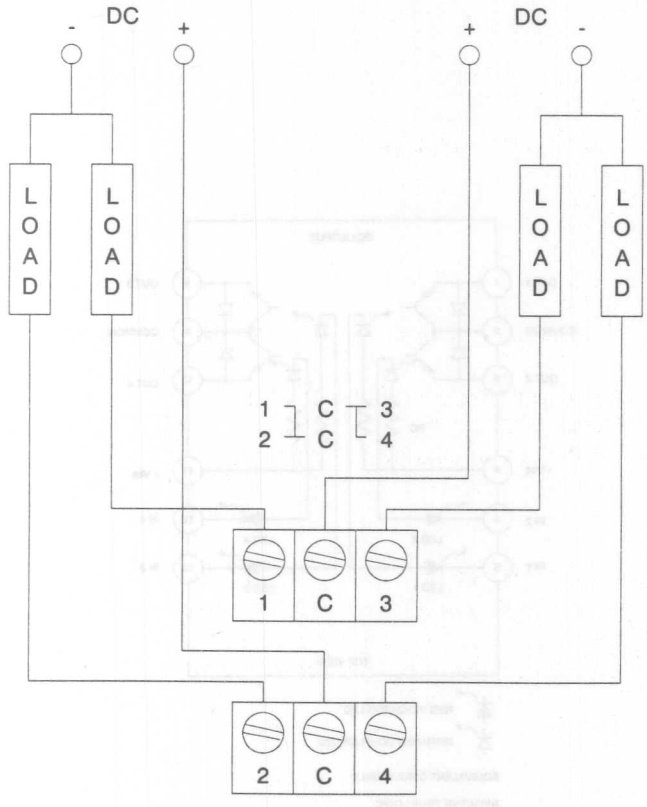


WIRING



LINE
SYMBOL



DC OUTPUT MODULE

Opto 22
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5 Volt Logic Voltage Only

AC INPUT

12 - 32 VAC	IDC5P
90 - 140 VAC	IAC5P

AC OUTPUT

12 - 140 VAC	OAC5P

DC INPUT

10 - 32 VDC	IDC5P
90 - 140 VDC	IAC5P

DC OUTPUT

5 - 60 VDC	ODC5P

AC INPUT MODULES
FLAT PAK, PLUG-IN

12 - 32 VAC
90 - 140 VAC

DESCRIPTION

The Flat Pak AC input modules are used for sensing ON/OFF alternating current (AC) voltage levels. All AC input modules are designed with filtering on the input and a hysteresis amplifier for high noise rejection and transient free "clean" switching. Each module provides up to 4000 V_{rms} of optical isolation between the field inputs and the logic side of the circuit.

The Flat Pak module are typical used on user-designed printed circuit boards where the standard single channel or Quad Pak module do not provide an exact fit. The Flat Pak modules are also ideal for circuit boards designed for computer chassis (i.e., Intel's MultiBus, STD bus, etc.) because of its low profile.

Typical uses and applications include sensing the presence or absence of voltage or sensing contact closures from sources such as:

Proximity Switches
Limit Switches
Selector Switches
Push Button And Toggle Switches
Thermostats

FEATURES

Industry standard plug-in module
4000 VAC optical isolation
UL recognized #E58169
CSA certified #35852
Operating temperature: -30 to 70° C
Built-in filtering for transient suppression and noise rejection

ORDERING GUIDE

Input Voltage VAC	Logic Voltage	Part Number
12 - 32	5	IDC5
90 - 140	5	IAC5

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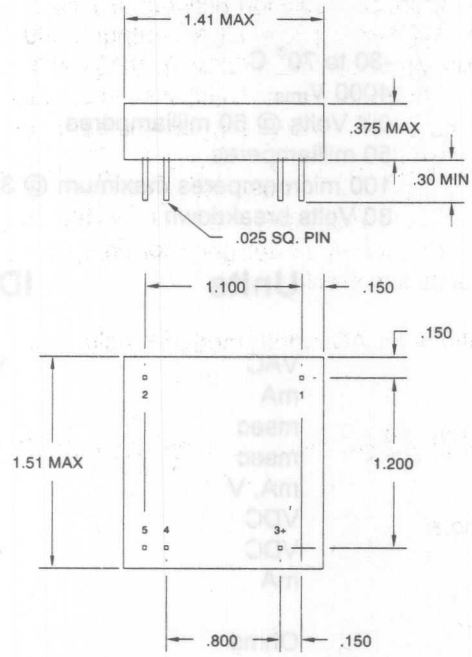
SPECIFICATIONS

GENERAL - Applies To All Models

Operating Ambient Temperature:	-30 to 70° C
Isolation Input-To-Output:	4000 V_{rms}
Output Voltage Drop:	0.4 Volts @ 50 milliamperes
Output Current:	50 milliamperes
Output Leakage With No Input:	100 microamperes maximum @ 30 VDC
Output Transistor:	30 Volts breakdown

	Units	IDC5P	IAC5P
Input Voltage Range:	VAC	12 - 32	90 - 140
Input Current @ Maximum Line:	mA	25	11
Turn-on Time:	msec	5	20
Turn-off Time:	msec	5	20
Input Allowed For No Output:	mA, V	1, 3	3, 45
Logic Supply Voltage-Nominal:	VDC	5	5
Logic Supply Voltage Range:	VDC	4.5 - 6	4.5 - 6
Logic Supply Current: @ Nominal Logic Voltage*	mA	12	12
Input Resistance: (R1 in Schematic Diagram)	Ohms	1.5k	14k
Control Resistance: (Rc in Schematic Diagram)	Ohms	220	220

DIMENSIONS



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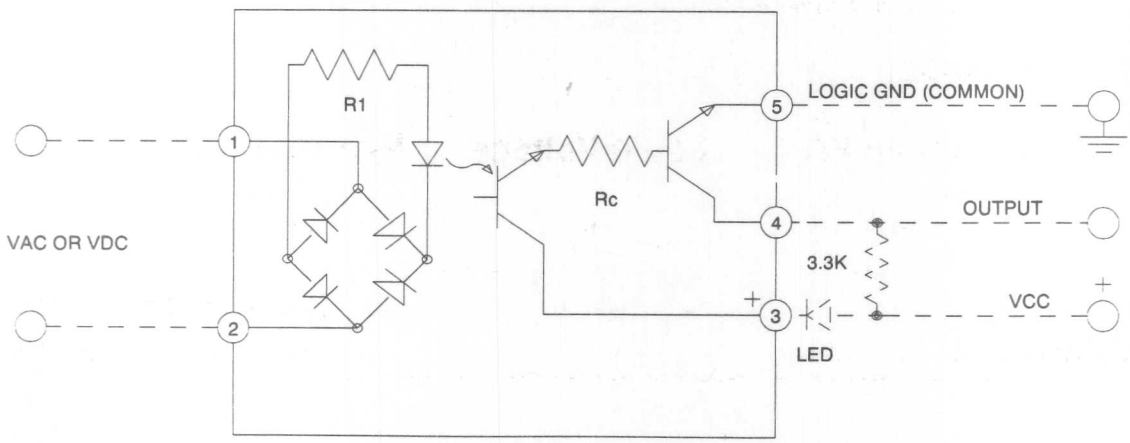

EQUIVALENT
CIRCUIT ONLY
NEGATIVE TRUE LOGIC

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AC OUTPUT MODULES
FLAT PAK, PLUG-IN

12 - 140 VAC

DESCRIPTION

The Flat Pak AC output modules are used for controlling or switching AC loads. Each module provides up to 4000 V_{rms} of optical isolation between the field devices and the control logic. With the exception of the OAC5A5 module, all AC output modules are equivalent to a single pole, single throw, normally open contact (FORM A, SPST-NO, Make). The OAC5A5 is equivalent to a single pole, single throw, normally closed contact (FORM B, SPST-NC, Break). All AC output modules feature zero voltage turn-on and zero current turn-off.

The Flat Pak module are typical used on user-designed printed circuit boards where the standard single channel or Quad Pak module do not provide an exact fit. The Flat Pak modules are also ideal for circuit boards designed for computer chassis (i.e., Intel's MultiBus, STD bus, etc.) because of its low profile.

Typical uses and applications for AC output modules include switching the following loads:

Relays
Solenoids And Contactors
Motor Starters
Heaters
Lamps Or Indicators

FEATURES

Industry standard plug-in module
4000 VAC optical isolation
Current rating: 3 amperes @ 45° C
Withstands one cycle surge of 80 amperes
UL recognized #E58169
CSA certified #35852
Operating temperature: -30 to 70° C
Zero voltage turn-on
Zero current turn-off

ORDERING GUIDE

Line Voltage VAC	Logic Voltage	Part Number
12 - 140	5	OAC5P

SPECIFICATIONS

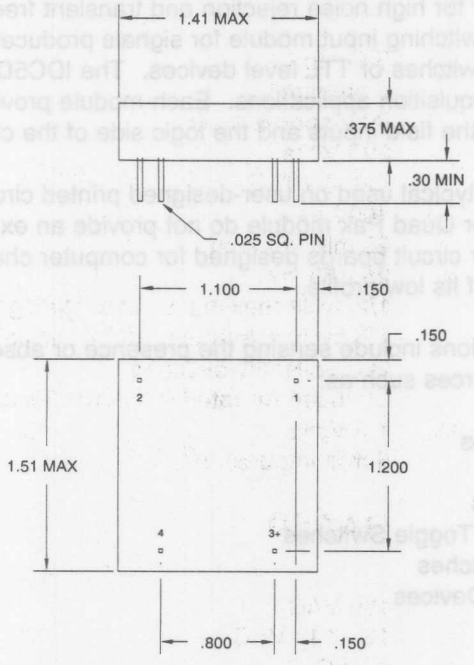
GENERAL - Applies To All Models

Current Rating:	
@ 45° C Ambient	3 amperes
@ 70° C Ambient	2 amperes
One Cycle Surge:	80 amperes peak
Peak Repetitive Voltage:	500 Volts
Operating Ambient Temperature:	-30 to 70° C
Isolation Input-To-Output:	4000 V_{rms}
Minimum Load Current:	20 milliamperes
Operating Frequency:	25 - 65 Hz
Turn-on Time:	1/2 cycle maximum - Zero Voltage
Turn-off Time:	1/2 cycle maximum - Zero Current
DV/DT - Off-state:	200 Volts/microsecond
DV/DT - Commutating:	Snubbed for rated 0.5 power factor load
Output Voltage Drop Maximum Peak:	1.6 Volts
Off-state Leakage:	5 milliamperes, rms

OAC5P

Line Voltage - Nominal:	120 VAC
Operating Voltage Range:	12 - 140 VAC
Logic Voltage - Nominal:	5 VAC
Logic Voltage Range (V_{cc}):	2.5 - 8 VDC
Logic Pickup Voltage:	2.55 VDC
Logic Dropout Voltage:	1 VDC
Logic Input Current: @ Normal Logic Voltage (I_{out} in Schematic Diagram)	12 mA
Control Resistance: (R_c in Schematic Diagram)	220 Ohms

DIMENSIONS



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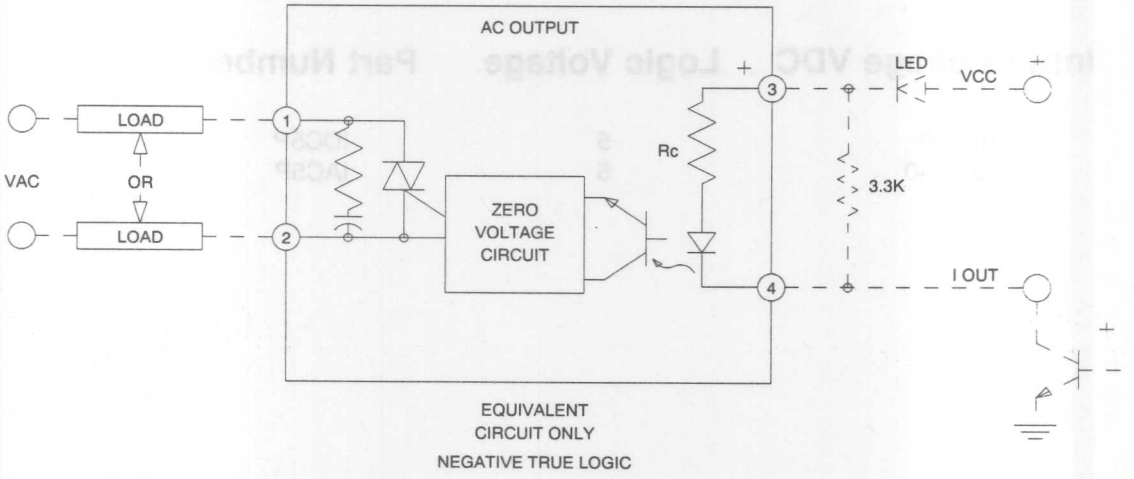

DC INPUT MODULES
FLAT PAK, PLUG-IN

10 - 32 VDC
90 - 140 VDC

DESCRIPTION

The Flat Pak DC input modules are used for sensing ON/OFF DC voltage levels. All DC input modules with the exception of the IDC5B and the IDC5D are designed with filtering on the input and a hysteresis amplifier for high noise rejection and transient free "clean" switching. The IDC5B module is a fast switching input module for signals produced by photoelectric switches, encoders, DC proximity switches or TTL level devices. The IDC5D is a low cost, DC only, input module for use in data acquisition applications. Each module provides up to 4000 V_{rms} of optical isolation between the field inputs and the logic side of the circuit.

The Flat Pak module are typical used on user-designed printed circuit boards where the standard single channel or Quad Pak module do not provide an exact fit. The Flat Pak modules are also ideal for circuit boards designed for computer chassis (i.e., Intel's MultiBus, STD bus, etc.) because of its low profile.

Typical uses and applications include sensing the presence or absence of voltage or sensing contact closures from sources such as:

Proximity Switches
Limit Switches
Selector Switches
Push Button And Toggle Switches
Photoelectric Switches
TTL Compatible Devices

FEATURES

Industry standard plug-in module
4000 VAC optical isolation
UL recognized #E58169
CSA certified #35852
Operating temperature: -30 to 70° C

ORDERING GUIDE

Input Voltage VDC	Logic Voltage	Part Number
10 - 32	5	IDC5P
90 - 140	5	IAC5P

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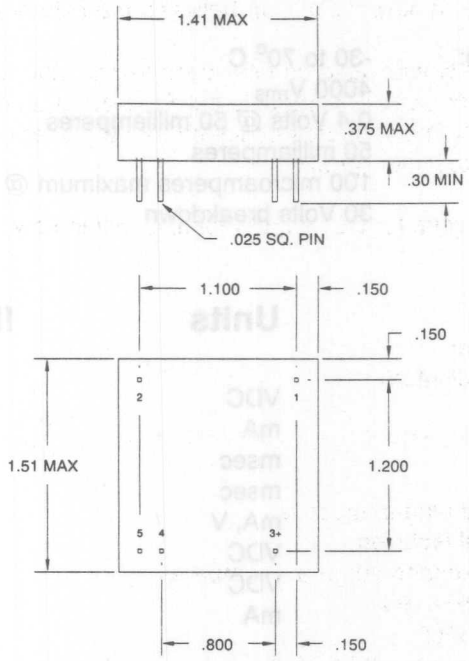
SPECIFICATIONS

GENERAL - Applies To All Models

Operating Ambient Temperature:	-30 to 70° C
Isolation Input-To-Output:	4000 V_{rms}
Output Voltage Drop:	0.4 Volts @ 50 milliamperes
Output Current:	50 milliamperes
Output Leakage With No Input:	100 microamperes maximum @ 30 VDC
Transistor:	30 Volts breakdown

	Units	IDC5P	IAC5P
Input Voltage Range:	VDC	10 - 32	90 - 140
Input Current @ Maximum Line:	mA	25	11
Turn-on Time:	msec	5	20
Turn-off Time:	msec	5	20
Input Allowed For No Output:	mA, V	1, 3	3, 45
Logic Supply Voltage - Nominal:	VDC	5	5
Logic Supply Voltage Range:	VDC	4.5 - 6	4.5 - 6
Logic Supply Current: @ Nominal Logic Voltage*	mA	12	12
Input Resistance: (R1 in Schematic Diagram)	Ohms	1k	14k
Control Resistance: (Rc in Schematic Diagram)	Ohms	220	220

DIMENSIONS



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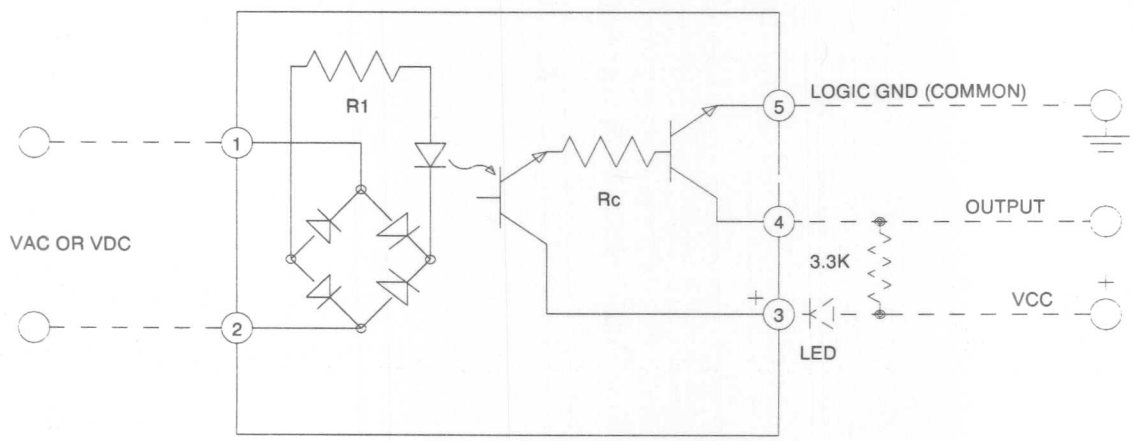


EQUIVALENT
CIRCUIT ONLY
NEGATIVE TRUE LOGIC

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

DC OUTPUT MODULES
FLAT PAK, PLUG-IN

5 - 60 VDC

DESCRIPTION

The Flat Pak DC output modules are used for controlling or switching DC loads. Each module provides up to 4000 V_{rms} of optical isolation between the field devices and the control logic.

The Flat Pak module are typical used on user-designed printed circuit boards where the standard single channel or Quad Pak module do not provide an exact fit. The Flat Pak modules are also ideal for circuit boards designed for computer chassis (i.e., Intel's MultiBus, STD bus, etc.) because of its low profile.

Typical uses and applications for DC output modules include switching the following loads:

DC Relays
DC Solenoids
DC Motor Starters
DC Lamps Or Indicators

FEATURES

Industry standard plug-in module
4000 VAC optical isolation
Withstands one second surge at 5 amperes
UL recognized #E58169
CSA certified #35852
Operating temperature: -30 to 70° C

ORDERING GUIDE

Line Voltage VDC	Logic Voltage	Part Number
5 - 60	5	ODC5P

SPECIFICATIONS

GENERAL - Applies To All Models

One Second Surge:	5 amperes
Operating Ambient Temperature:	-30 to 70° C
Isolation Input-To-Output:	4000 V_{rms}
Turn-on Time:	100 microseconds
Turn-off Time:	750 microseconds
Output Voltage Drop Maximum:	1.6 Volts

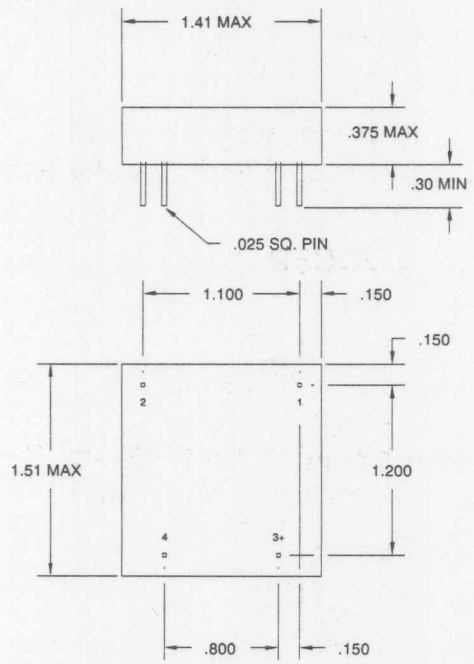
ODC5P

Line Voltage - Maximum:	60 VDC
Operating Voltage Range:	5 - 60 VDC
Current Rating:	
@ 45° C Ambient	3 Amps
@ 70° C Ambient	2 Amps
Off-state Leakage:	1 mA
@ Maximum Voltage	
Logic Voltage - Nominal:	5 VDC
Logic Voltage Range (V_{cc}):	2.5 - 8 VDC
Logic Pickup Voltage:	2.5 VDC
Logic Dropout Voltage:	1 VDC
Logic Input Current:	12 mA
@ Nominal Logic Voltage*	
Control Resistance:	220 Ohms
(R_c in Schematic Diagram)	

DC OUTPUT MODULE
FLAT PAK, PLUG-IN

5 - 60 VDC

DIMENSIONS



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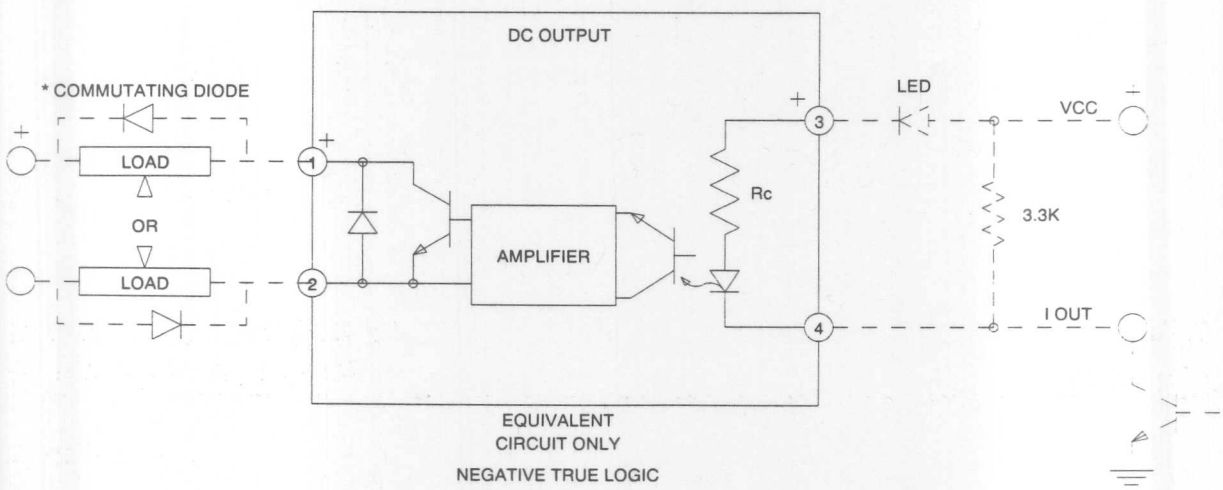

* Must be used on inductive loads.

Note: Also compatible with Totem Pole or 3-State Output.

Notes:

Opto 22
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SECTION 7

ANALOG I/O MODULES

DESCRIPTION		PAGE
Input Modules		
AD3/AD3T	4 To 20 mA	7 - 1
AD4	ICTD Temperature Probe	7 - 5
AD5/AD5T	Type J Thermocouple	7 - 8
AD6/AD6T/AD6HS	0 To 5 VDC	7 - 12
AD7	0 To 10 VDC	7 - 14
AD8/AD8T	Type K Thermocouple	7 - 16
AD9T	0 To 50 mV	7 - 20
AD10T2	100 Ohm Platinum RTD	7 - 22
AD11	-5 To 5 VDC	7 - 26
AD12	-10 To 10 VDC	7 - 28
AD13T	0 To 100 mV	7 - 30
AD14T	10 Ohm Copper RTD	7 - 32
AD15T	28 To 140 VAC	7 - 34
AD16T	0 To 5 Amp AC/DC	7 - 36
AD17T	Type R/S Thermocouple	7 - 38
AD18T	Type T Thermocouple	7 - 43
AD19T	Type E Thermocouple	7 - 46
AD20	0 To 10,800 Hz Rate	7 - 49
Output Modules		
DA3/DA3T	4 To 20 mA	7 - 51
DA4/DA4T	0 To 5 VDC	7 - 54
DA5	0 To 10 VDC	7 - 56
DA6	-5 To 5 VDC	7 - 58
DA7	-10 To 10 VDC	7 - 60
DA8	0 To 20 mA	7 - 62

I/O Modules Categorized By Module Type

TYPE	DESCRIPTION	MODEL	PAGE
CURRENT INPUTS	4 To 20 mA	AD3/AD3T	7 - 1
	0 To 5 Amp AC/DC	AD16T	7 - 36
FREQUENCY (RATE) INPUT	0 To 10,800 Hz	AD20	7 - 49
ICTD INPUT TEMPERATURE PROBE	Opto 22 ICTD	AD4	7 - 5
RTD INPUTS	100 Ohm Platinum	AD10T2	7 - 22
	10 Ohm Copper	AD14T	7 - 32
THERMOCOUPLE INPUTS	Type J	AD5/AD5T	7 - 8
	Type K	AD8/AD8T	7 - 16
	Type R/S	AD17T	7 - 38
	Type T	AD18T	7 - 43
	Type E	AD19T	7 - 46
VOLTAGE INPUTS	0 To 5 VDC	AD6/AD6T/AD6HS	7 - 12
	0 To 10 VDC	AD7	7 - 14
	0 To 50 mV	AD9T	7 - 20
	-5 To 5 VDC	AD11	7 - 26
	-10 To 10 VDC	AD12	7 - 28
	0 To 100 mV	AD13T	7 - 30
	28 To 140 VAC	AD15T	7 - 34
CURRENT OUTPUTS	4 To 20 mA	DA3/DA3T	7 - 51
	0 To 20 mA	DA8	7 - 62
VOLTAGE OUTPUTS	0 To 5 VDC	DA4/DA4T	7 - 54
	0 To 10 VDC	DA5	7 - 56
	-5 To 5 VDC	DA6	7 - 58
	-10 To 10 VDC	DA7	7 - 60

ANALOG MODULE POWER REQUIREMENTS

MODULE TYPE	MODEL	+15 VDC	-15 VDC
Input Modules			
4 To 20 mA	AD3	13 mA	7.5 mA
4 To 20 mA, Isolated	AD3T	35 mA	35 mA
ICTD Temperature Probe	AD4	16 mA	11 mA
Type J Thermocouple	AD5	17 mA	12 mA
Type J, Isolated	AD5T	35 mA	35 mA
0 To 5 VDC	AD6	16 mA	11 mA
0 To 5 VDC, High Speed	AD6HS	16 mA	11 mA
0 To 5 VDC, Isolated	AD6T	35 mA	35 mA
0 To 10 VDC	AD7	16 mA	11 mA
Type K Thermocouple	AD8	17 mA	12 mA
Type K, Isolated	AD8T	35 mA	35 mA
0 To 50 mV	AD9T	35 mA	35 mA
100 Ohm RTD, Isolated	AD10T2	45 mA	45 mA
-5 To 5 VDC	AD11	15 mA	12 mA
-10 To 10 VDC	AD12	15 mA	12 mA
0 To 100 mV, Isolated	AD13T	35 mA	35 mA
10 Ohm RTD, Isolated	AD14T	48 mA	48 mA
28 To 140 VAC, Isolated	AD15T	35 mA	35 mA
0 To 5 Amp AC/DC, Isolated	AD16T	35 mA	35 mA
Type R or S, Isolated	AD17T	30 mA	30 mA
Type T, Isolated	AD18T	30 mA	30 mA
Type E, Isolated	AD19T	30 mA	30 mA
Frequency (Rate) Input	AD20	25 mA	15 mA
Output Modules			
4 To 20 mA	DA3	20 mA	10 mA
4 To 20 mA, Isolated	DA3T	22 mA	22 mA
0 To 5 VDC	DA4	20 mA	10 mA
0 To 5 VDC, Isolated	DA4T	35 mA	35 mA
0 To 10 VDC	DA5	20 mA	10 mA
-5 To 5 VDC	DA6	20 mA	10 mA
-10 To 10 VDC	DA7	20 mA	10 mA
0 To 20 mA	DA8	20 mA	10 mA

4 TO 20 mA CURRENT INPUT MODULES

AD3
AD3T

DESCRIPTION

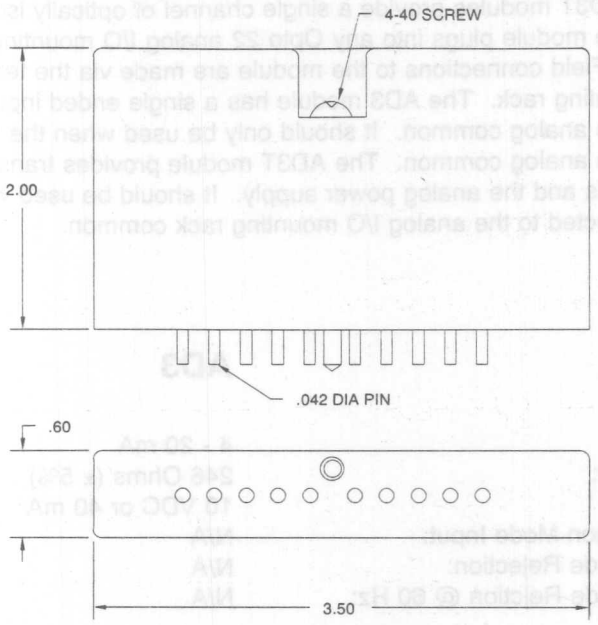
The AD3 and AD3T modules provide a single channel of optically isolated analog-to-digital conversion. The module plugs into any Opto 22 analog I/O mounting rack and is secured by a captive screw. Field connections to the module are made via the terminal strip located on the analog I/O mounting rack. The AD3 module has a single ended input, its negative (-) input is connected to the analog common. It should only be used when the loop supply can be connected to the analog common. The AD3T module provides transformer isolation between the field terminals and the analog power supply. It should be used when the loop supply cannot be connected to the analog I/O mounting rack common.

SPECIFICATIONS

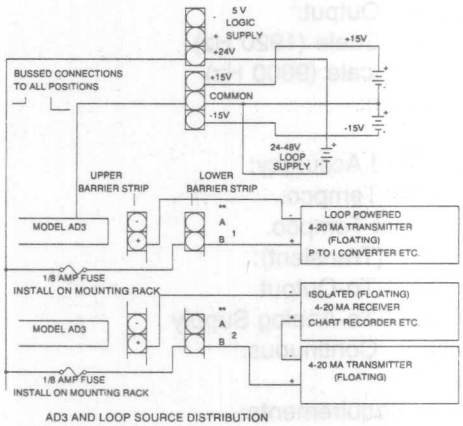
	AD3	AD3T
Signal Input:	4 - 20 mA	4 - 20 mA
Input Impedance:	246 Ohms (± 5%)	249 Ohms (± 1%)
Maximum Input:	10 VDC or 40 mA	10 VDC or 40 mA
Maximum Common Mode Input:	N/A	± 500 V
DC Common Mode Rejection:	N/A	> -120 dB
AC Common Mode Rejction @ 60 Hz:	N/A	> -120 dB
Input Response Time: (% Of Span/Δ mA/Δ Time)	99.9%/15.984mA/<3ms	99.9%/15.984mA/<3ms
Input vs. Output:		
Zero Scale (1920 Hz)	4 mA	4 mA
Full Scale (9600 Hz)	20 mA	20 mA
Resolution:	3.9 μA	3.9 μA
Calibrated Accuracy:	± 0.1%	± 0.1%
Gain Tempco.	± 55 PPM/ ^{o} C	± 55 PPM/ ^{o} C
Offset Tempco.	± 20 PPM/ ^{o} C	± 20 PPM/ ^{o} C
Isolation (Transient):		
Input-To-Output	4000 V_{rms}	4000 V_{rms}
Input-To-Analog Supply	N/A	4000 V_{rms}
Isolation, Continuous:	N/A	500 VDC
Power Requirements:		
Module	15 V @ 13 mA -15 V @ 7.5 mA	30 V @ 35 mA*
Logic	5 V @ 1.6 mA	5 V @ 1.6 mA
Ambient Temperature:		
Operating	0 To 70^{o} C	0 To 70^{o} C
Storage	-25 To 85^{o} C	-25 To 85^{o} C

* The 30 volts is derived from the ± 15 VDC power supply connected to the Opto 22 analog I/O mounting rack.

DIMENSIONS



SAMPLE WIRING DIAGRAM

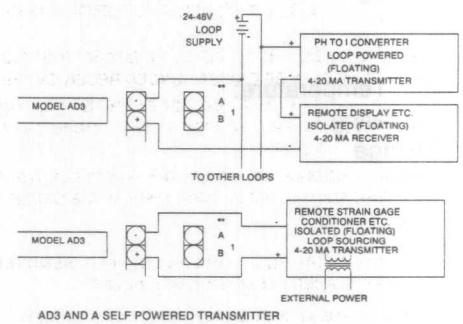


AD3 AND LOOP SOURCE DISTRIBUTION

THE LOOP SHOULD ONLY BE GROUNDED AT THE - SIDE OF THE 24V LOOP SUPPLY. THERE CAN ONLY BE ONE GROUNDED RECEIVER PER 4-20 MA LOOP.

IF THERE IS MORE THAN ONE RECEIVER PER 4-20 MA LOOP, ONLY ONE CAN BE GROUNDED, IT'S INPUT (TYPICALLY THE "-" INPUT) MUST BE CONNECTED TO THE 24V GROUND

** ALL OF THE LOWER "A" TERMINALS ARE BUSSED (CONNECTED) ON THE ANALOG MOUNTING RACKS.



AD3 AND A SELF POWERED TRANSMITTER

THE AD3 (-) INPUT IS DIRECTLY CONNECTED TO THE ANALOG COMMON

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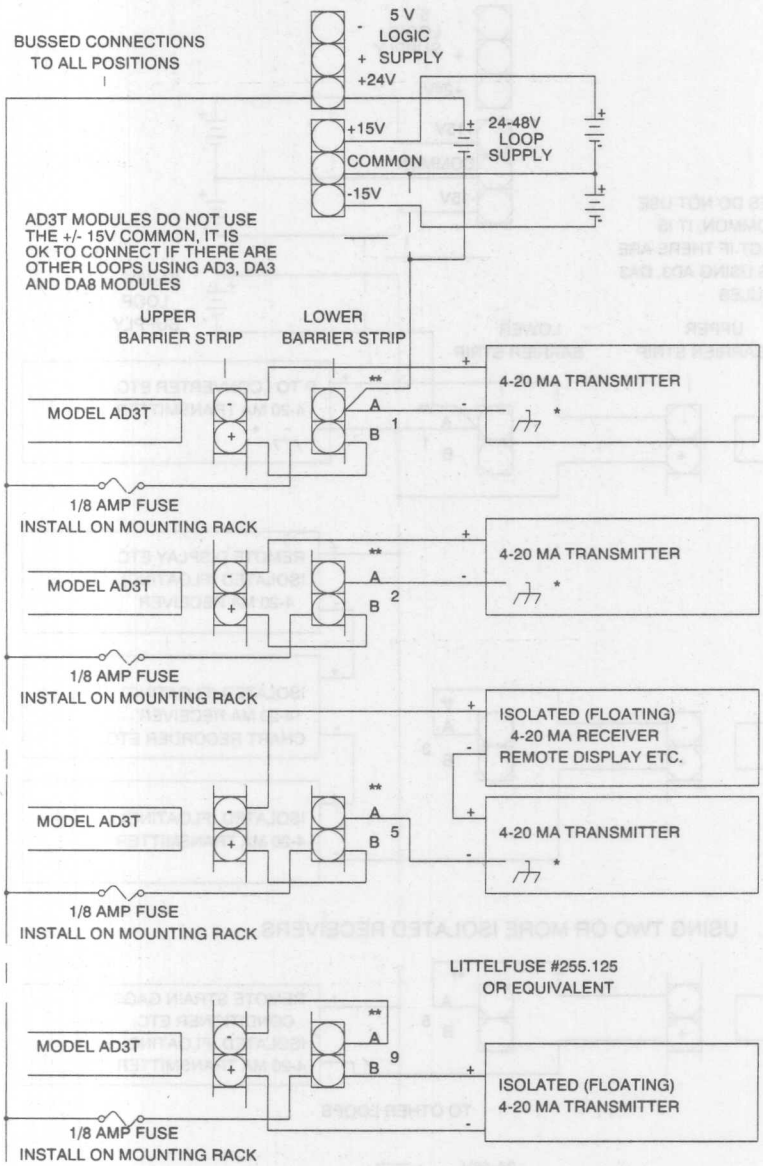
SAMPLE WIRING DIAGRAM (Continue)



AD3T AND LOOP SOURCE DISTRIBUTION ***

THE LOOP SHOULD ONLY BE GROUNDED AT THE - SIDE OF THE 24V LOOP SUPPLY
THERE CAN ONLY BE ONE GROUNDED RECEIVER PER 4-20 MA LOOP

IF THERE IS MORE THAN ONE RECEIVER PER 4-20 MA LOOP ONLY ONE CAN BE GROUNDED, ITS INPUT (TYPICALLY THE "-" INPUT) MUST BE CONNECTED TO THE 24V GROUND.

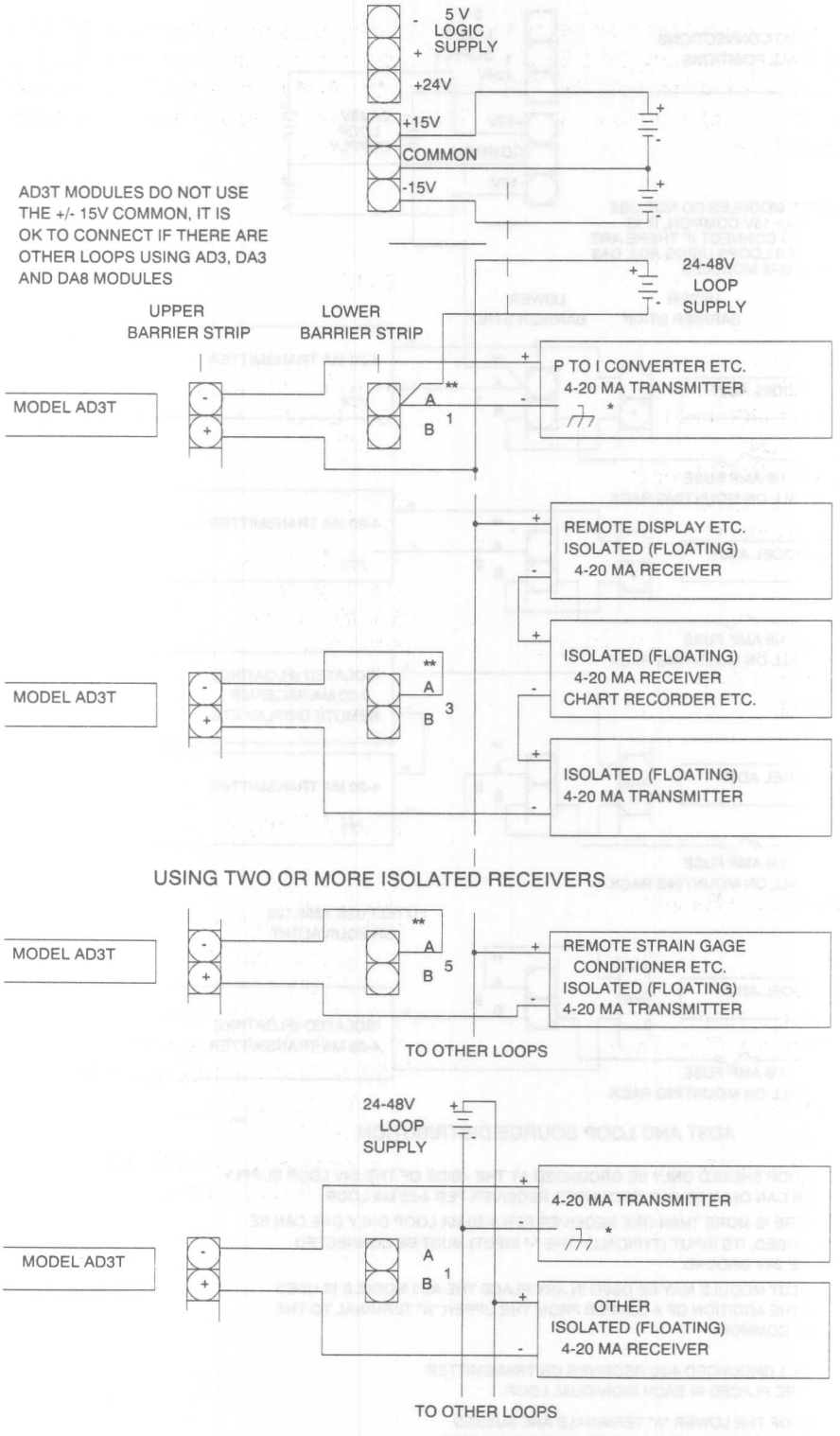
THE AD3T MODULE MAY BE USED IN ANY PLACE THE AD3 MODULE IS USED WITH THE ADDITION OF A JUMPER FROM THE UPPER "A" TERMINAL TO THE +/- 15V COMMON.

* ONLY 1 GROUNDED 4-20 RECEIVER OR TRANSMITTER MAY BE PLACED IN EACH INDIVIDUAL LOOP.

** ALL OF THE LOWER "A" TERMINALS ARE BUSSED (CONNECTED) ON THE ANALOG MOUNTING RACKS.

*** THERE IS NO CHANNEL TO CHANNEL ISOLATION IF LOOP SOURCE DISTRIBUTION IS USED, IF CHANNEL TO CHANNEL ISOLATION IS DESIRED THEN SEPARATE LOOP SUPPLIES MUST BE USED FOR EACH CHANNEL.

SAMPLE WIRING DIAGRAM (Continue)



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ICTD INPUT MODULE (USE WITH OPTO 22 ICTD PROBE) AD4

DESCRIPTION

The AD4 module provides a single channel of optically isolated analog-to-digital conversion. The module plugs into any Opto 22 analog I/O mounting rack and is secured by a captive screw. Field connections from the ICTD probe to the AD4 module are made via the terminal located on the analog I/O mounting rack. The ICTD can be used in energy management, freezer control, etc.

SPECIFICATIONS

AD4

Input vs. Output:	
Zero Scale (1920 Hz)	-188.4° C (84.6 µA)
Full Scale (9600 Hz)	150° C (423 µA)
Accuracy of AD4:	± 0.3° C
Accuracy With ICTD Probe:	± 0.8° C
Resolution With ICTD Probe:	0.083° C
Power Requirements:	
Module	15 V @ 16 mA
	-15 V @ 11 mA
Logic	5 V @ 1.6 mA
Isolation (Transient) Input-To-Output:	4000 V_{rms}
Ambient Temperature:	
Operating	0 To 70° C
Storage	-25 To 85° C

ICTD Probe

Input Temperature Range:	-40 To 100° C
Output:	233 µA @ -40° C
	373 µA @ 100° C
Sensitivity:	1 µA/ ° K
Input Response Time:	5 %/7° C/7.8 seconds
(% Of Span/Δ °C/Δ Time)	20 %/28° C/33.6 seconds
	63.2 %/88.48° C/150 seconds
Output Accuracy:	± 0.5° C @ 25° C
Repeatability:	± 0.25° C
Thermal Time Constant:	2.5 minutes typical (still air)
Cable Length:	> 2,000 ft (610 meter)

CONVERSION FORMULA

Conversion to degrees Centigrade can be performed using the linear equation shown below:

TEMP = (0.08262 * VALUE%) - 188.4

VALUE% is a decimal number representing the value of the module:

VALUE% is < 0 when module is below zero scale.
VALUE% is 0 when module is at zero scale.
VALUE% is 4095 when module is at full scale.
VALUE% is > 4095 when module is above full scale.

If the value has been returned by an OPTOMUX station, the 4096 offset that OPTOMUX adds to input values for over- and under-range indication must be subtracted. This is not necessary when using the OPTOWARE software driver package because the subtraction is performed by the OPTOWARE driver.

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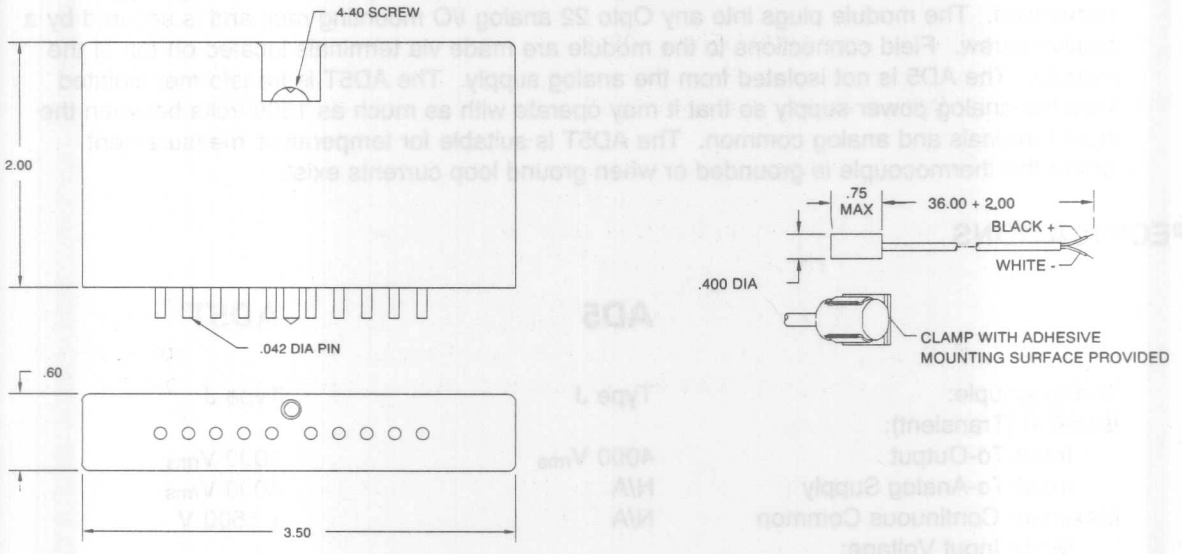
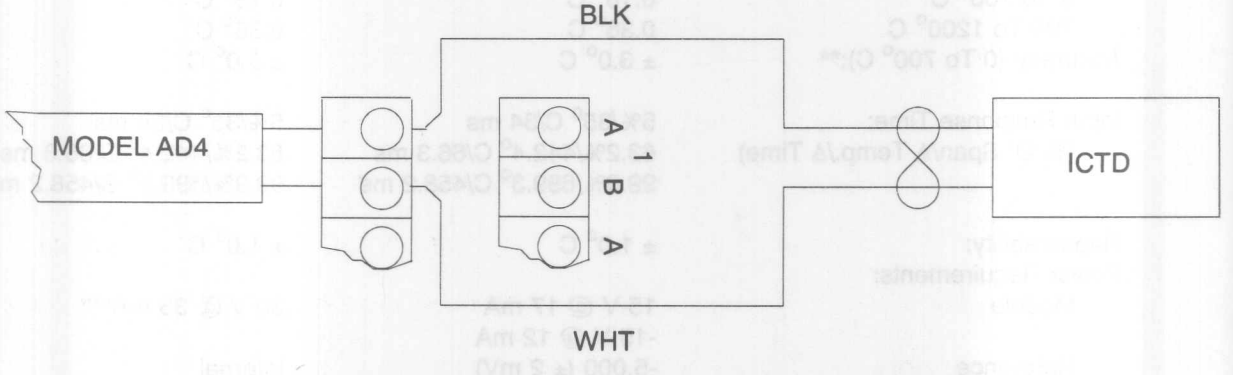
CONVERSION FORMULA



Conversion to degrees Centigrade can be performed using the linear equation shown below:



THE I.C. TEMPERATURE DEVICE (ICTD) IS A 2-WIRE TEMPERATURE DETECTOR. CONNECT THE WHITE WIRE TO THE UPPER ROW "B" TERMINAL AND THE BLACK WIRE TO UPPER ROW "A". UP TO 2000 FEET OF WIRE MAY BE INSERTED BETWEEN THE ICTD SENSOR AND THE AD4 MODULE.

TYPE J THERMOCOUPLE INPUT MODULES

AD5 AD5T

DESCRIPTION

The AD5 and AD5T modules provide a single channel of optically isolated analog-to-digital conversion. The module plugs into any Opto 22 analog I/O mounting rack and is secured by a captive screw. Field connections to the module are made via terminals located on top of the module. The AD5 is not isolated from the analog supply. The AD5T is transformer isolated from the analog power supply so that it may operate with as much as 1500 volts between the input terminals and analog common. The AD5T is suitable for temperature measurement where the thermocouple is grounded or when ground loop currents exist.

SPECIFICATIONS

	AD5	AD5T
Thermocouple:	Type J	Type J
Isolation (Transient):		
Input-To-Output	4000 V_{rms}	4000 V_{rms}
Input-To-Analog Supply	N/A	4000 V_{rms}
Maximum Continuous Common Mode Input Voltage:	N/A	± 1500 V
Cold Junction Compensated:	Yes	Yes
Temperature Range:	-20 To 1200° C (-4 To 2192° F)	-20 To 1200° C (-4 To 2192° F)
Input vs. Output:*		
Zero Scale (1200 Hz)	0° C	0° C
Full Scale (9600 Hz)	700° C	700° C
Average Resolution:		
0 To 700° C	0.18° C	0.18° C
700 To 1200° C	0.36° C	0.36° C
Accuracy (0 To 700° C):**	± 3.0° C	± 3.0° C
Input Response Time:	5%/35° C/34 ms	5%/35° C/34 ms
(% Of Span/Δ Temp./Δ Time)	63.2%/442.4° C/66.3 ms	63.2%/442.4° C/66.3 ms
	99.9%/699.3° C/458.2 ms	99.9%/699.3° C/458.2 ms
Repeatability:	± 1.0° C	± 1.0° C
Power Requirements:		
Module	15 V @ 17 mA	30 V @ 35 mA***
	-15 V @ 12 mA	
Reference	-5.000 (± 2 mV)	Internal
Logic	5 V @ 1.6 mA	5 V @ 1.6 mA
Ambient Temperature:		
Operating	0 To 70° C	0 To 70° C
Storage	-25 To 85° C	-25 To 85° C

* A tested step algorithm for linearization is included.

** Accuracy may be improved by the use of the "Set Offsets" or "Set Gains" command in the OPTOMUX command set.

*** The 30 volts is derived from the ± 15 VDC power supply connected to the Opto 22 analog I/O mounting rack.

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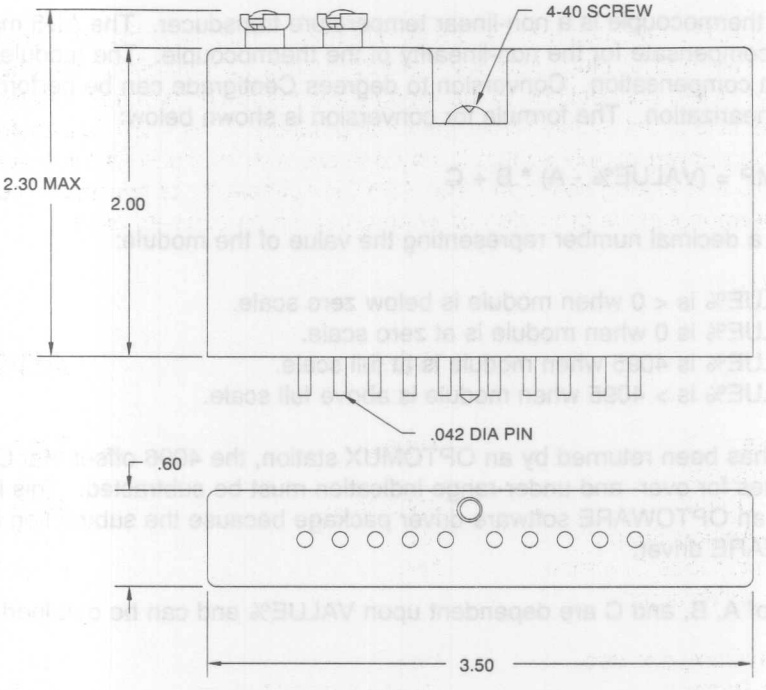
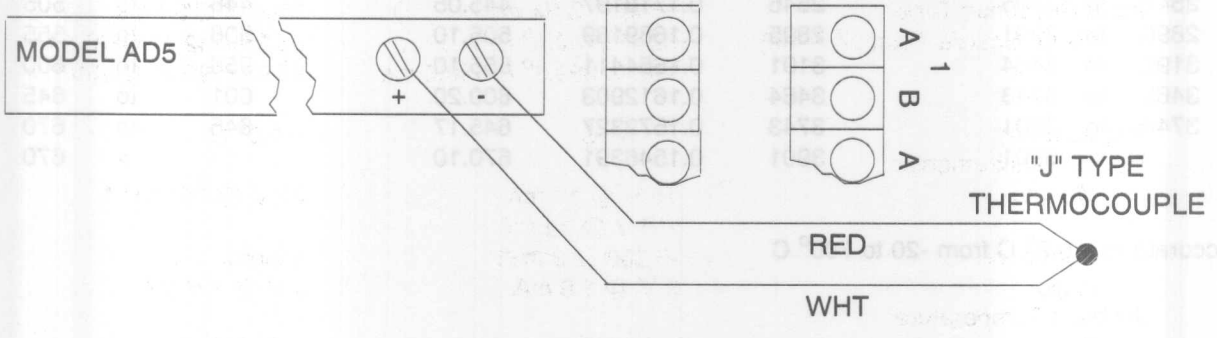
DIMENSIONS



SAMPLE WIRING DIAGRAM



LINEARIZATION ALGORITHMS

The Type J thermocouple is a non-linear temperature transducer. The AD5 modules are linear and do not compensate for the non-linearity of the thermocouple. The modules have built-in cold junction compensation. Conversion to degrees Centigrade can be performed using piecewise linearization. The formula for conversion is shown below:

TEMP = (VALUE% - A) * B + C

VALUE% is a decimal number representing the value of the module:

VALUE% is < 0 when module is below zero scale.
VALUE% is 0 when module is at zero scale.
VALUE% is 4095 when module is at full scale.
VALUE% is > 4095 when module is above full scale.

If the value has been returned by an OPTOMUX station, the 4096 offset that OPTOMUX adds to input values for over- and under-range indication must be subtracted. This is not necessary when using an OPTOWARE software driver package because the subtraction is performed by the OPTOWARE driver.

The values of A, B, and C are dependent upon VALUE% and can be obtained from the table below.

VALUE%			A	B	C	TEMP RANGE		
	<	1	104	0.1923076	20.15	-20	to	-1
1	to	161	0	0.1863354	0.10	0	to	30
162	to	354	161	0.1813472	30.19	31	to	65
355	to	551	354	0.1776649	65.10	66	to	100
552	to	867	551	0.1740506	100.15	101	to	155
868	to	1766	867	0.1724137	155.10	156	to	310
1767	to	2546	1766	0.1730769	310.00	311	to	445
2547	to	2895	2546	0.1719197	445.05	446	to	505
2896	to	3191	2895	0.1689189	505.10	506	to	555
3192	to	3464	3191	0.1654411	555.10	556	to	600
3465	to	3743	3464	0.1612903	600.20	601	to	645
3744	to	3901	3743	0.1572327	645.17	646	to	670
	>	3901	3901	0.1546391	670.10		>	670

Accurate to ± 0.2° C from -20 to 700° C

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```
100   '*      BASIC SUBROUTINE FOR TYPE J THERMOCOUPLE
110   '*            LINEARIZATION
120   '*
130   '*      VAL% contains the value returned from the AD5/AD5T module.
140   '*      TEMP will contain the temperature in degrees centigrade.
150   '*
160   '*      This program is accurate to ± 0.2° C from -20 to 700° C
170   '*
180   '*      -20° TO 1° C
190   IF VAL% < 1 THEN A = 104 : B = 0.19231 : C = 20.15 : GOTO 580
200   '*
210   '*      0 To 30° C
220   IF VAL% < 162 THEN A = 0 : B = 0.18634 : C = 0.10 : GOTO 580
230   '*
240   '*      31 To 65° C
250   IF VAL% < 355 THEN A = 161 : B = 0.18135 : C = 30.19 : GOTO 580
260   '*
270   '*      66 To 100° C
280   IF VAL% < 552 THEN A = 354 : B = 0.17767 : C = 65.10 : GOTO 580
290   '*
300   '*      101 To 155° C
310   IF VAL% < 868 THEN A = 551 : B = 0.17405 : C = 100.15 : GOTO 580
320   '*
330   '*      156 To 310° C
340   IF VAL% < 1767 THEN A = 867 : B = 0.17241 : C = 155.10 : GOTO 580
350   '*
360   '*      311 To 445° C
370   IF VAL% < 2547 THEN A = 1766 : B = 0.17308 : C = 310.00 : GOTO 580
380   '*
390   '*      446 To 505° C
400   IF VAL% < 2895 THEN A = 2546 : B = 0.17192 : C = 445.05 : GOTO 580
410   '*
420   '*      506 To 555° C
430   IF VAL% < 3192 THEN A = 2895 : B = 0.16892 : C = 505.10 : GOTO 580
440   '*
450   '*      556 To 600° C
460   IF VAL% < 3465 THEN A = 3191 : B = 0.16544 : C = 555.10 : GOTO 580
470   '*
480   '*      601 To 645° C
490   IF VAL% < 3744 THEN A = 3464 : B = 0.16129 : C = 600.20 : GOTO 580
500   '*
510   '*      646 To 670° C
520   IF VAL% < 3902 THEN A = 3743 : B = 0.15723 : C = 645.17 : GOTO 580
530   '*
540   '*      > 670° C
550   A = 3901 : B = 0.15464 : C = 670.10
560   '*
570   '*      Compute temperature in degrees centigrade
580   TEMP = (VAL% - A) * B + C
590   RETURN
```

DESCRIPTION

The AD6 module provides a single channel of optically isolated analog-to-digital conversion. The module plugs into any Opto 22 analog I/O mounting rack and is secured by a captive screw. Field connections to the module are made via terminals located on the analog I/O mounting rack.

The AD6 module has differential inputs. This module can be used for voltages out of its nominal input range (see input under/over range specification below). The AD6T is transformer isolated from the analog power supply so that it can operate with up to 500 volts between the input terminals and the analog common. The AD6HS is a high-speed version for use with the PAMUX system.

SPECIFICATIONS

	AD6	AD6T	AD6HS
Input Range:	0 To 5 VDC	0 To 5 VDC	0 To 5 VDC
Span:	5 V	5 V	5 V
Input Under/Over Range:	-0.125 To 11 V	-0.125 To 11 V	-0.125 To 11 V
Resolution:	1.22 mV	1.22 mV	1.22 mV
Input Filtering:	-3 dB @ 1 Hz -34 dB @ 60 Hz, min.	-3 dB @ 1 Hz -34 dB @ 60 Hz, min.	-3 dB @ 300 Hz
DC Common Mode Rejection:	-65 dB, typical	> -120 dB	65 dB, typical
AC Common Mode Rejection:	-60 dB @ 60 Hz, typ.	> -120 dB	65 dB @ 60 Hz, typ.
Input Response Time:	5%/0.25V/8.4ms	5%/0.25V/8.4ms	5%/0.25V/<3ms
(% Of Span/Δ Volts/Δ Time)	63.2%/3.16V/165ms 99.9%/4.99V/1138ms	63.2%/3.16V/165ms 99.9%/4.99V/1138ms	63.2%/3.16V/<3ms 99.9%/4.99V/<3ms
Input Resistance:			
Differential	1 MegaOhm	1 MegaOhm	1 MegaOhm
Either Input-To-Analog Com.	1 MegaOhm	15 GigaOhms	1 MegaOhm
Common Mode Range:	± 24 V	± 500 V	± 24 V
Maximum Survivable Input:			
Differential	± 300 VDC/220 VAC	± 300 VDC/220 VAC	± 300 VDC/220 VAC
Either Input-To-Analog Com.	± 300 VDC/220 VAC	± 750 VDC/600 VAC	± 300 VDC/220 VAC
Input vs. Output:			
Zero Scale (1920 Hz)	0 V	0 V	0 V
Full Scale (9600 Hz)	5 V	5 V	5 V
Accuracy:*	0.1%	0.1%	0.1%
Gain Tempco.	55 PPM/ ° C	55 PPM/ ° C	55 PPM/ ° C
Offset Tempco.	20 PPM/ ° C	20 PPM/ ° C	20 PPM/ ° C
Power Requirements:			
Module	15 V @ 16 mA -15 V @ 11 mA	30 V @ 35 mA**	15 V @ 16 mA -15 V @ 16 mA
Reference	-5.000 V (± 2 mV)	Internal	-5.000 V (± 2 mV)
Logic	5 V @ 1.6 mA	5 V @ 1.6 mA	5 V @ 1.6 mA
Ambient Temperature:			
Operating	0 To 70° C	0 To 70° C	0 To 70° C
Storage	-25 To 85° C	-25 To 85° C	-25 To 85° C

* May be improved by the use of the "Set Offset" or "Set Gain" commands in the OPTOMUX command set.

** The 30 volts is derived from the ± 15 volts connected to the Opto 22 analog I/O mounting rack.

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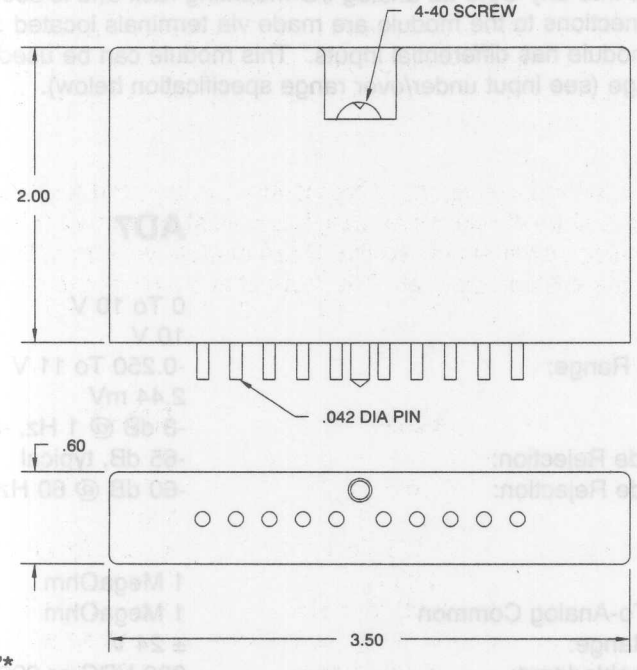
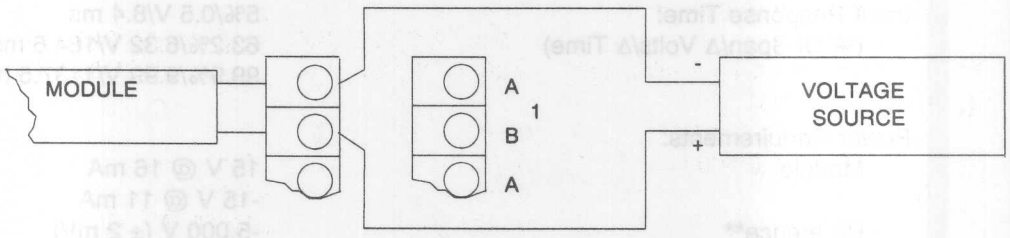
```
100  '*      BASIC SUBROUTINE FOR TYPE J THERMOCOUPLE
110  '*      LINEARIZATION
```




```
120  '*
130  '*      VAL% contains the value returned from the AD5/AD5T module.
```



THE VOLTAGE INPUT MODULES USE ONLY THE UPPER ROW A & B TERMINALS. "A" IS NEGATIVE (-) AND "B" IS POSITIVE (+).
THE INPUT DEVICE IS THE VOLTAGE SOURCE.

```
140  '*      TEMP will contain the temperature in degrees centigrade.
```

0 TO 10 VDC INPUT MODULE AD7

DESCRIPTION

The AD7 module provides a single channel of optically isolated analog-to-digital conversion. The module plugs into any Opto 22 analog I/O mounting rack and is secured by a captive screw. Field connections to the module are made via terminals located on the I/O mounting rack. The AD7 module has differential inputs. This module can be used for voltages out of its nominal input range (see input under/over range specification below).

SPECIFICATIONS

	AD7
Input Range:	0 To 10 V
Span:	10 V
Input Under/Over Range:	-0.250 To 11 V
Resolution:	2.44 mV
Input Filtering:	-3 dB @ 1 Hz, -34 dB @ 60 Hz, minimum
DC Common Mode Rejection:	-65 dB, typical
AC Common Mode Rejection:	-60 dB @ 60 Hz, typical
Input Resistance:	
Differential	1 MegaOhm
Either Input-To-Analog Common	1 MegaOhm
Common Mode Range:	± 24 V
Maximum Surviveable Input: (Differential Or Either Input-To-Analog Common)	300 VDC or 220 VAC
Input vs. Output:	
Zero Scale (1920 Hz)	0 Volts
Full Scale (9600 Hz)	10 Volts
Accuracy:*	0.1%
Gain Tempco.	55 PPM/ ^{o} C
Offset Tempco.	20 PPM/ ^{o} C
Input Response Time: (% Of Span/Δ Volts/Δ Time)	5%/0.5 V/8.4 ms 63.2%/6.32 V/164.6 ms 99.9%/9.99 V/1137.5 ms
Power Requirements:	
Module	15 V @ 16 mA -15 V @ 11 mA
Reference**	-5.000 V (± 2 mV)
Logic	5 V @ 1.6 mA
Ambient Temperature:	
Operating	0 To 70^{o} C
Storage	-25 To 85^{o} C

* May be improved by the use of the "Set Offset" or "Set Gain" commands in the OPTOMUX command set.

** The reference is derived from the ± 15 volts and is provided by the Opto 22 analog I/O mounting rack.

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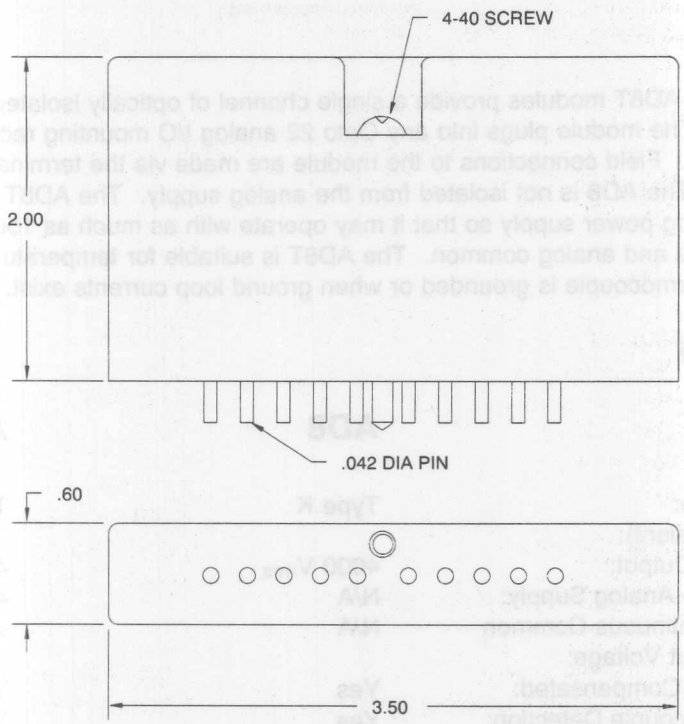
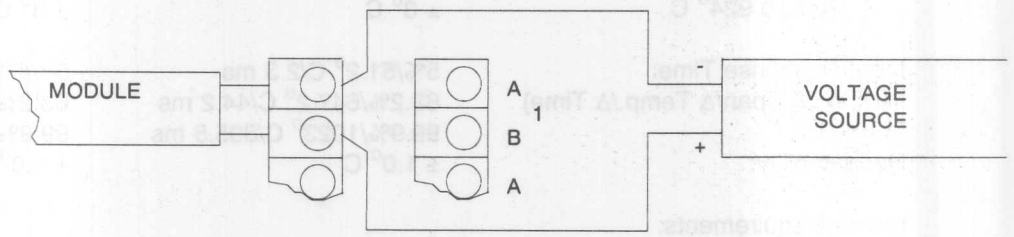
DIMENSIONS



SAMPLE WIRING DIAGRAM



THE VOLTAGE INPUT MODULES USE ONLY THE UPPER ROW A & B TERMINALS. "A" IS NEGATIVE (-) AND "B" IS POSITIVE (+).
THE INPUT DEVICE IS THE VOLTAGE SOURCE.

TYPE K THERMOCOUPLE INPUT MODULES

AD8 AD8T

DESCRIPTION

The AD8 and AD8T modules provide a single channel of optically isolated analog-to-digital conversion. The module plugs into any Opto 22 analog I/O mounting rack and is secured by a captive screw. Field connections to the module are made via the terminals located on top of the module. The AD8 is not isolated from the analog supply. The AD8T is transformer isolated from the analog power supply so that it may operate with as much as 1500 volts between the input terminals and analog common. The AD8T is suitable for temperature measurement where the thermocouple is grounded or when ground loop currents exist.

SPECIFICATIONS

	AD8	AD8T
Thermocouple:	Type K	Type K
Isolation (transient):		
Input-To-Output:	4000 V_{rms}	4000 V_{rms}
Output-To-Analog Supply:	N/A	4000 V_{rms}
Maximum Continuous Common Mode Input Voltage:	N/A	± 1500 V
Cold Junction Compensated:	Yes	Yes
Open Thermocouple Detection:	Yes	Yes
Temperature Range:	-125 To 1250° C (-193 To 2282° F)	-125 To 1250° C (-193 To 2282° F)
Input vs. Output:*		
Zero Scale (1920 Hz)	-100° C	-100° C
Full Scale (9600 Hz)	924° C	924° C
Average Resolution:		
-100 To 924° C	± 0.25° C	± 0.25° C
924 To 1250° C	± 0.5° C	± 0.5° C
Accuracy:**		
-100 To 924° C	± 3° C	± 3° C
Input Response Time:	5%/51.2° C/2.3 ms	5%/51.2° C/2.3 ms
(% Of Span/Δ Temp./Δ Time)	63.2%/647.2° C/44.2 ms	63.2%/647.2° C/44.2 ms
	99.9%/1023° C/305.5 ms	99.9%/1023° C/305.5 ms
Repeatability:	± 1.0° C	± 1.0° C
Power Requirements:		
Module	15 V @ 17 mA	30 V @ 35 mA***
	-15 V @ 12 mA	
Reference	-5.000 (± 2 mV)	Internal
Logic	5 V @ 1.6 mA	5 V @ 1.6 mA
Ambient Temperature:		
Operating	0 To 70° C	0 To 70° C
Storage	-25 To 85° C	-25 To 85° C

* The AD8/AD8T modules are linear devices. A tested step algorithm for linearization is included.

** Accuracy may be improved by the use of the "Set Offset" or "Set Gain" commands in the OPTOMUX command set.

*** The 30 volts is derived from the ± 15 VDC power supply connected to the Opto 22 analog I/O mounting rack.

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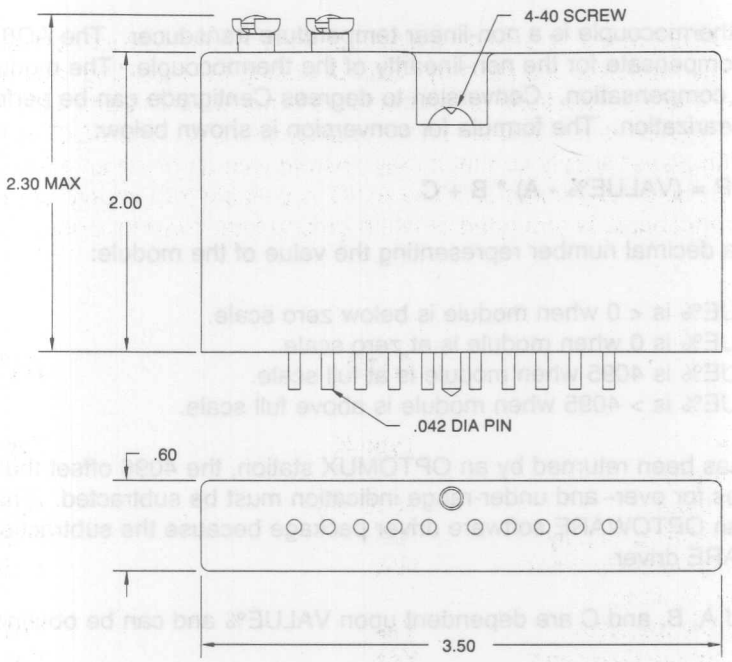
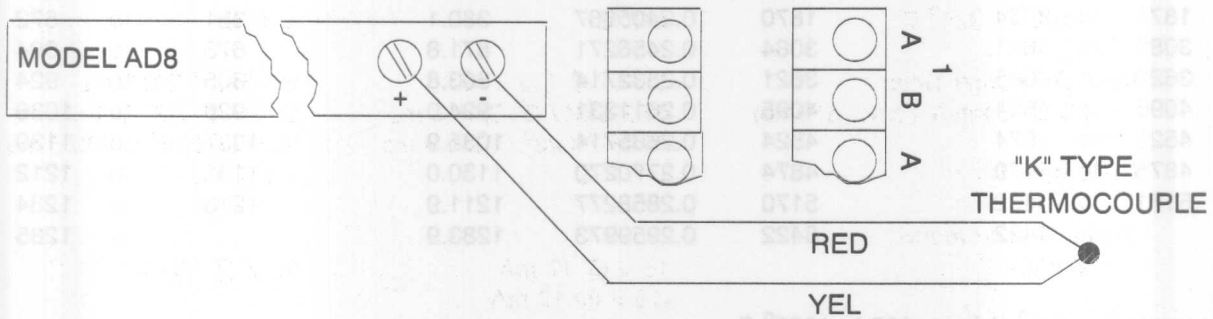
DIMENSIONS



SAMPLE WIRING DIAGRAM



LINEARIZATION ALGORITHM

The Type K thermocouple is a non-linear temperature transducer. The AD8 modules are linear and do not compensate for the non-linearity of the thermocouple. The modules have built-in cold junction compensation. Conversion to degrees Centigrade can be performed using piecewise linearization. The formula for conversion is shown below:

TEMP = (VALUE% - A) * B + C

VALUE% is a decimal number representing the value of the module:

VALUE% is < 0 when module is below zero scale.
VALUE% is 0 when module is at zero scale.
VALUE% is 4095 when module is at full scale.
VALUE% is > 4095 when module is above full scale.

If the value has been returned by an OPTOMUX station, the 4096 offset that OPTOMUX adds to input values for over- and under-range indication must be subtracted. This is not necessary when using an OPTOWARE software driver package because the subtraction is performed by the OPTOWARE driver.

The values of A, B, and C are dependent upon VALUE% and can be obtained from the table below.

VALUE%			A	B	C	TEMP RANGE		
	<	96	0	0.3167899	-99.6		<	-70
96	to	198	95	0.2892961	-69.6	-70	to	-40
199	to	348	198	0.2675585	-39.8	-39	to	0
349	to	578	348	0.2518454	0.3	1	to	58
579	to	909	478	0.2478090	57.9	59	to	140
910	to	1365	909	0.2541073	140.2	141	to	256
1366	to	1870	1365	0.2456905	256.2	257	to	380
1871	to	3084	1870	0.2405867	380.1	381	to	672
3085	to	3621	3084	0.2456271	671.8	673	to	804
3622	to	4095	3621	0.2532714	803.8	805	to	924
4096	to	4524	4095	0.2611331	924.0	925	to	1036
4525	to	4874	4524	0.2685714	1035.9	1037	to	1130
4875	to	5170	4874	0.2770270	1130.0	1131	to	1212
5171	to	5422	5170	0.2858277	1211.9	1213	to	1284
	>	5422	5422	0.2959973	1283.9		>	1285

Accurate to ± 0.4° C from -100 to 1250° C

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```
100   '*      BASIC SUBROUTINE FOR TYPE K THERMOCOUPLE
110   '*            LINEARIZATION
120   '*      VAL% contains the value returned from the AD8 module.
130   '*      TEMP will contain the temperature in degrees centigrade.
140   '*
150   '*      > -70° C
160   IF VAL% < 96 THEN A = 0 : B = 0.31679 : C = 99.6 : GOTO 600
170   '*
180   '*      -70 To -40° C
190   IF VAL% < 199 THEN A = 95 : B = 0.28930 : C = 69.6 : GOTO 600
200   '*
210   '*      -39 To 0° C
220   IF VAL% < 349 THEN A = 198 : B = 0.26756 : C = 39.8 : GOTO 600
230   '*
240   '*      1 To 58° C
250   IF VAL% < 579 THEN A = 348 : B = 0.25185 : C = 0.3 : GOTO 600
260   '*
270   '*      59 To 140° C
280   IF VAL% < 910 THEN A = 578 : B = 0.24781 : C = 57.9 : GOTO 600
290   '*
300   '*      141 To 256° C
310   IF VAL% < 1366 THEN A = 909 : B = 0.25411 : C = 140.2 : GOTO 600
320   '*
330   '*      257 To 380° C
340   IF VAL% < 1871 THEN A = 1365 : B = 0.24569 : C = 256.2 : GOTO 600
350   '*
360   '*      381 To 672° C
370   IF VAL% < 3085 THEN A = 1870 : B = 0.24059 : C = 380.1 : GOTO 600
380   '*
390   '*      673 To 804° C
400   IF VAL% < 3622 THEN A = 3084 : B = 0.24563 : C = 671.80 : GOTO 600
410   '*
420   '*      805 To 924° C
430   IF VAL% < 4096 THEN A = 3621 : B = 0.25327 : C = 803.8 : GOTO 600
440   '*
450   '*      925 To 1036° C
460   IF VAL% < 4525 THEN A = 4095 : B = 0.26113 : C = 924.0 : GOTO 600
470   '*
480   '*      1037 To 1130° C
490   IF VAL% <  4875 THEN A = 4524 : B = 0.26857 : C = 1035.9 : GOTO 600
500   '*
510   '*      1131 To 1212° C
520   IF VAL% < 5171 THEN A = 4874 : B = 0.27703 : C = 1130.0 : GOTO 600
530   '*
540   '*      1213 To 1284° C
550   IF VAL% < 5423 THEN A = 5170 : B = 0.28583 : C = 1211.9 : GOTO 600
560   '*
570   '*      > 1285° C
580   A = 3901 : B = 0.15464 : C = 670.10
590   '*      Compute temperature in degrees Centigrade
600   TEMP = (VAL% - A) * B + C
610   RETURN
```

0 TO 50 mV INPUT MODULE AD9T

DESCRIPTION

The AD9T module provides a single channel of optically isolated analog-to-digital conversion with transient isolation. The module plugs into any Opto 22 analog I/O mounting rack and is secured by a captive screw. Field connections to the module are made via terminals located on top of the module. The AD9T is transformer isolated from the analog power supply so that it may operate with 1500 volts between the input terminals and analog common or the frequency output. The AD9T is suitable for strain gauge type transducers or when galvanic isolation is required.

SPECIFICATIONS

	AD9T
Input Range:	0 To 50 mV
Input Under/Over Range:	-0.125 To 110 mV
Resolution:	
0 To 50 mV	12 µV
50 To 100 mV	24 µV
Input Filtering:	-3 dB @ 24 Hz
	-8.5 dB @ 60 Hz, minimum
DC Common Mode Rejection:	> -120 dB
AC Common Mode Rejection:	> -120 dB
Input Response Time:	99.9%/49.95 mV/35 ms
(% Of Span/Δ mV/Δ Time)	
Input Impedance:	> 100 MegaOhms
Maximum Recommended Source Resistance:	10 K Ohms
Common Mode Input Range:	± 1500 V (both inputs to analog common)
Common Mode Input Impedance:	> 15 GigaOhms @ 1500 V
Maximum Differential Input:	± 10 V
Input vs. Output:	
Zero Scale (1920 Hz)	0 mV
Full Scale (9600 Hz)	50 mV
Accuracy:*	± 0.2%
Gain Tempco.	6 µV/ ^{o} C
Offset Tempco.	3 µV/ ^{o} C
Isolation (transient):	
Input-To-Logic Output (optically coupled)	4000 V_{rms}
Module-To-Module (transformer isolated)	4000 V_{rms}
Power Requirements:	
Module	30 V (± 1.0 V) @ 35 mA**
Logic	5 V @ 1.6 mA
Ambient Temperature:	
Operating	0 To 70^{o} C
Storage	-25 To 85^{o} C

* May be improved by the use of the "Set Offset" or "Set Gain" commands in the OPTOMUX command set.

** The 30 volts is derived from the ± 15 VDC power supply connected to the Opto 22 analog I/O mounting rack.

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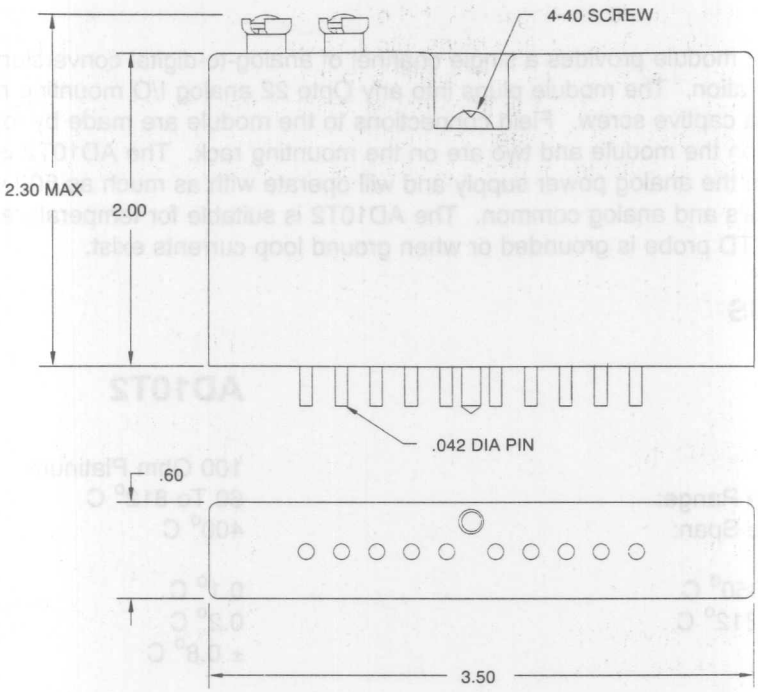
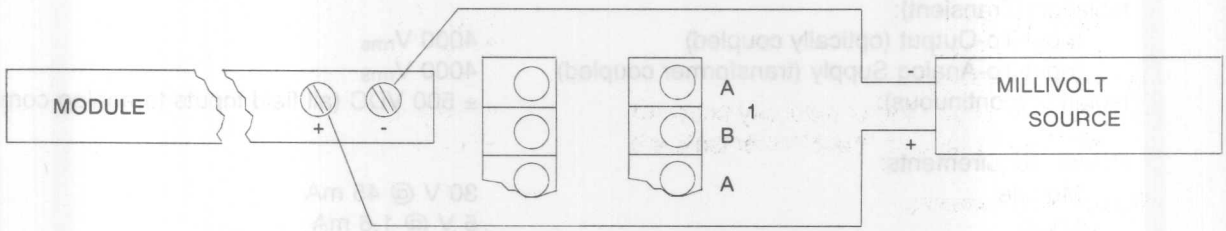
DIMENSIONS



SAMPLE WIRING DIAGRAM



100 OHM RTD INPUT MODULE

AD10T2
(REPLACES AD10T)

DESCRIPTION

The AD10T2 module provides a single channel of analog-to-digital conversion with 4000 V_{rms} transient isolation. The module plugs into any Opto 22 analog I/O mounting rack and is secured by a captive screw. Field connections to the module are made by four terminals. Two are located on the module and two are on the mounting rack. The AD10T2 is transformer isolated from the analog power supply and will operate with as much as 500 volts between the input terminals and analog common. The AD10T2 is suitable for temperature measurement where the RTD probe is grounded or when ground loop currents exist.

SPECIFICATIONS

	AD10T2
RTD Input:	100 Ohm Platinum
Temperature Range:	60 To 812° C
Temperature Span:	400° C
Resolution:	
-50 To 350° C	0.1° C
350 To 812° C	0.2° C
Accuracy:*	± 0.8° C
Input Response Time: (% Of Span/Δ Temp./Δ Time)	99.9%/399.6° C/100 ms
Repeatability:	± 0.4° C
DC Common Mode Rejection:	> -120 dB
AC Common Mode Rejection @ 60 Hz:	> -120 dB
Excitation (Typical):	656 μA @ constant current
Maximum Lead Resistance:	> 200 Ohms
Input vs. Output:	
Zero Scale (1920 Hz)	-50° C
Full Scale (9600 Hz)	350° C
Maximum Overrange (17280 Hz)	812° C
Isolation (Transient):	
Input-To-Output (optically coupled)	4000 V_{rms}
Input-To-Analog Supply (transformer coupled)	4000 V_{rms}
Isolation (continuous):	± 500 VDC (all field inputs to analog common)
Power Requirements:	
Module	30 V @ 45 mA
Logic	5 V @ 1.6 mA
Ambient Temperature:	
Operating	0 To 70° C
Storage	-25 To 85° C

Note: A 2- or 3-wire RTD may be used, see the Sample Wiring Diagram.

* When the AD10T2 is used with a 100 Ohm platinum RTD (@ = 0.00385) and 3-wire hookup.
** The 30 volts is derived from the ± 15 VDC power supply connected to the Opto 22 analog I/O mounting rack.

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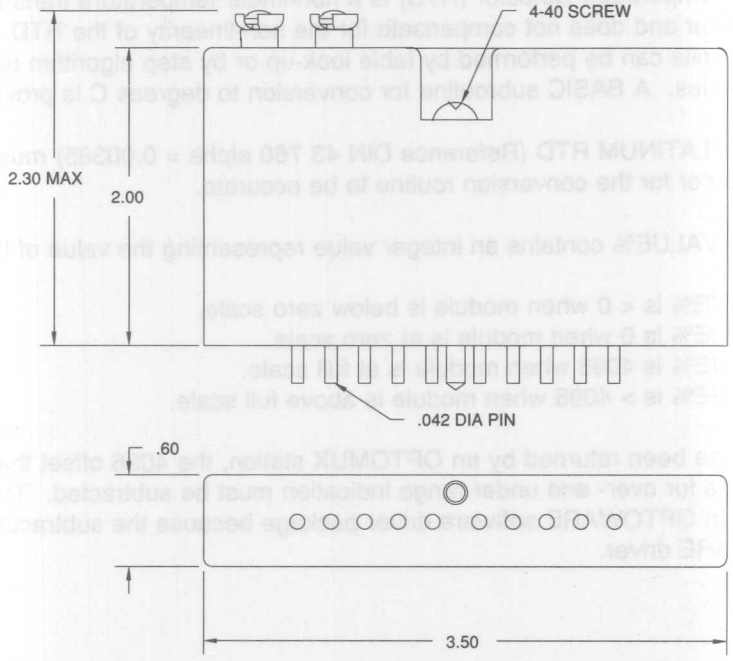
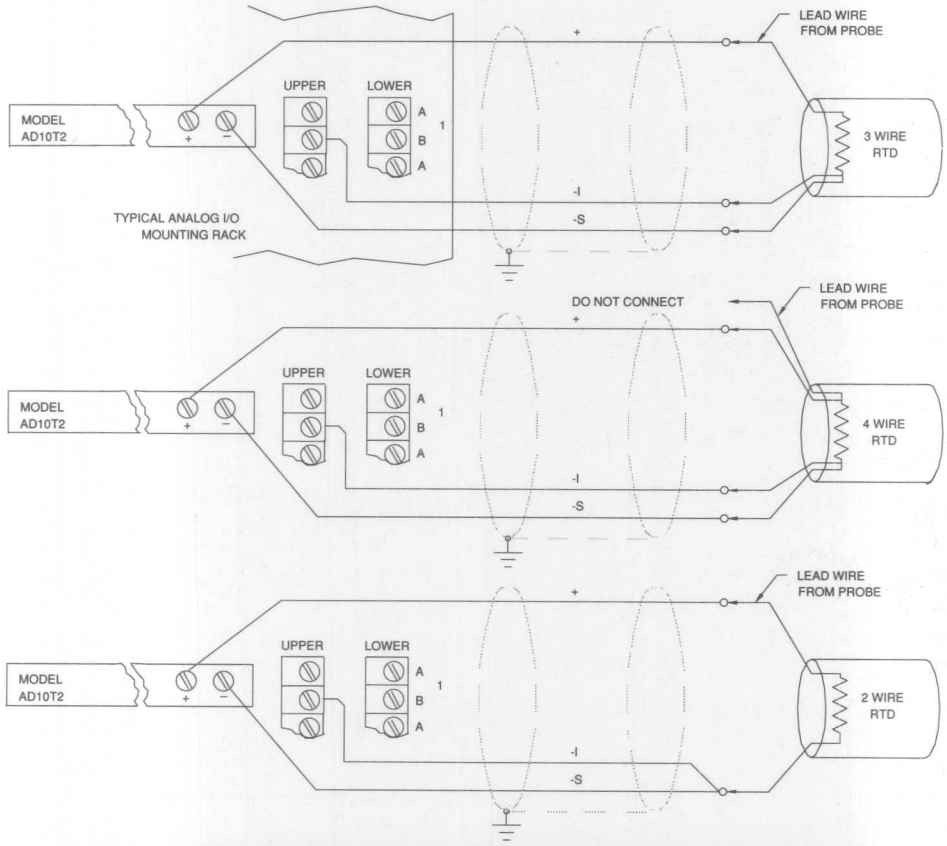
DIMENSIONS



SAMPLE WIRING DIAGRAM



LINEARIZATION ALGORITHM

A Resistive Temperature Detector (RTD) is a non-linear temperature transducer. The AD10T2 module is linear and does not compensate for the non-linearity of the RTD. Conversion to engineering units can be performed by table look-up or by step algorithm using standard calibration tables. A BASIC subroutine for conversion to degrees C is provided.

A 100 Ohm PLATINUM RTD (Reference DIN 43 760 alpha = 0.00385) must be used with the AD10T2 in order for the conversion routine to be accurate.

The variable VALUE% contains an integer value representing the value of the module.

VALUE% is < 0 when module is below zero scale.
VALUE% is 0 when module is at zero scale.
VALUE% is 4095 when module is at full scale.
VALUE% is > 4095 when module is above full scale.

If the value has been returned by an OPTOMUX station, the 4096 offset that OPTOMUX adds to input values for over- and under-range indication must be subtracted. This is not necessary when using an OPTOWARE software driver package because the subtraction is performed by the OPTOWARE driver.

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

LINEARIZATION ALGORITHM

```
100   '*
110   '*
120   '*      SUBROUTINE FOR 100 OHM PLATINUM RTD LINEARIZATION
130   '*
140   '*      VALUE% contains the value returned from the AD10T2 module
150   '*      TEMP will contain the temperature in degrees centigrade
160   '*
170   '*
180   '*
190   IF VALUE% <= 6218 THEN GOTO 260
200   '*
210   '*      580 to 850° C accuracy is better than ± 0.2° C
220   '*
230   A = (VALUE% - 6219) * 0.118525 - 135
240   TEMP = A - (-0.000188 * A^2) + 711.56 : RETURN
250   '*
260   IF VALUE% <= 4094 THEN GOTO 330
270   '*
280   '*      350 to 580° C, accuracy is better than ± 0.15° C
290   '*
300   A = (VALUE% - 4095) * 0.1082863 - 115
310   TEMP = A - (-0.00017 * A^2) + 462.76 : RETURN
320   '*
330   IF VALUE% <= 2110 THEN GOTO 400
340   '*
350   '*      150 to 350° C, accuracy is better than ± 0.15° C
360   '*
370   A = (VALUE% - 2111) * 0.1008065 - 100
380   TEMP = A - (-0.000156 * A^2) + 248.45 : RETURN
390   '*
400   '*      -50 to 150° C, accuracy is better than ± 0.15° C
410   '*
420   A = (VALUE% * 9.474182E-02) - 50
430   TEMP = A - (-0.000156 * A^2) - (0.0156 * A) - 1.11 : RETURN
```

-5 TO 5 VDC INPUT MODULE AD11

DESCRIPTION

The AD11 module provides a single channel of optically isolated analog-to-digital conversion. The module plugs into any Opto 22 analog I/O mounting rack and is secured by a captive screw. Field connections to the module are made via the terminal strip located on the analog I/O mounting rack. The AD11 module has differential inputs. This module can be used for voltages out of its nominal input range. See under/over range specification below.

SPECIFICATIONS

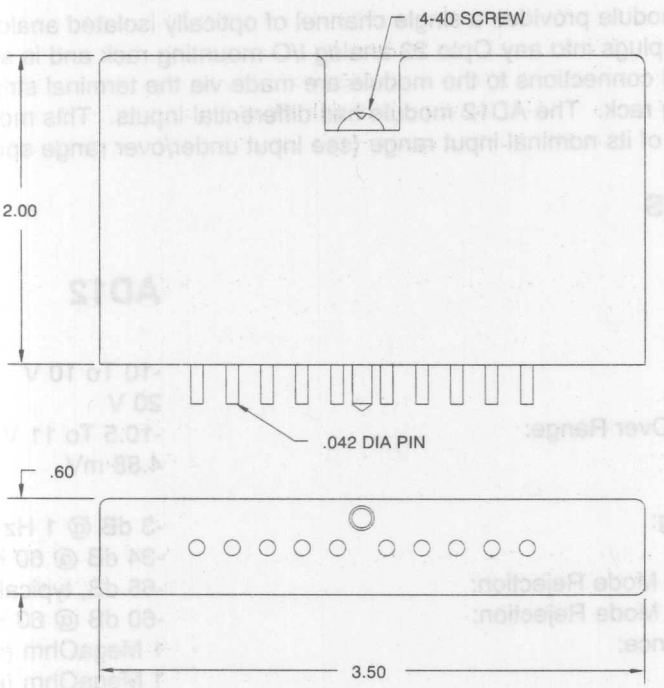
	AD11
Input Range:	-5 To 5 V
Span:	10 V
Input Under/Over Range:	-5.25 To 11 V
Resolution:	2.44 mV
Input Filtering:	-3 dB @ 1 Hz
	-34 dB @ 60 Hz, minimum
DC Common Mode Rejection:	-65 dB, typical
AC Common Mode Rejection:	-60 dB @ 60 Hz, typical
Input Resistance:	1 MegaOhm (differential)
	1 MegaOhm (either input to analog common)
Common Mode Range:	± 24 V
Maximum Surviveable Input:	± 300 VDC or 220 VAC (differential or either input to analog common)
Input vs. Output:	
Zero Scale (1920 Hz)	-5 V
Full Scale (9600 Hz)	5 V
Accuracy:*	0.1%
Gain Tempco.	55 PPM/ ^{o} C
Offset Tempco.	20 PPM/ ^{o} C
Input Response Time:	5%/0.5 V/8.4 ms
(% Of Span/Δ Volts/Δ Time)	63.2%/6.32 V/164.6 ms
	99.9%/9.99 V/1137.5 ms
Power Requirements:	
Module	15 V @ 15 mA
	-15 V @ 12 mA
Reference**	-5.000 V (± 2 mV)
Logic	5 V @ 1.6 mA
Ambient Temperature:	
Operating	0 To 70^{o} C
Storage	-25 To 85^{o} C

* May be improved by the use of the "Set Offset" or "Set Gain" commands in the OPTOMUX command set.

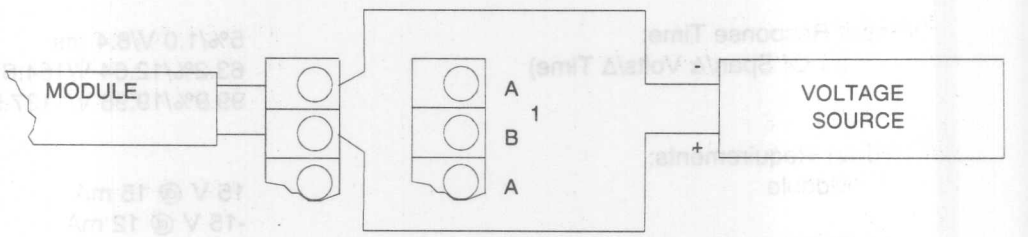
** The reference is derived from the ± 15 VDC and is provided by the Opto 22 analog I/O mounting rack.

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

DIMENSIONS



SAMPLE WIRING DIAGRAM



THE VOLTAGE INPUT MODULES USE ONLY THE UPPER ROW A & B TERMINALS. "A" IS NEGATIVE (-) AND "B" IS POSITIVE (+). THE INPUT DEVICE IS THE VOLTAGE SOURCE.

-10 TO 10 VDC INPUT MODULE AD12

DESCRIPTION

The AD12 module provides a single channel of optically isolated analog-to-digital conversion. The module plugs into any Opto 22 analog I/O mounting rack and is secured by a captive screw. Field connections to the module are made via the terminal strip located on the analog I/O mounting rack. The AD12 module has differential inputs. This module can be used for voltages out of its nominal input range (see input under/over range specification below).

SPECIFICATIONS

	AD12
Input Range:	-10 To 10 V
Span:	20 V
Input Under/Over Range:	-10.5 To 11 V
Resolution:	4.88 mV
Input Filtering:	-3 dB @ 1 Hz
	-34 dB @ 60 Hz, minimum
DC Common Mode Rejection:	-65 dB, typical
AC Common Mode Rejection:	-60 dB @ 60 Hz, typical
Input Resistance:	1 MegaOhm (differential)
	1 MegaOhm (either input to analog common)
Common Mode Range:	± 24 V
Maximum Surviveable Input:	± 300 VDC or 220 VAC (differential or either input to analog common)
Input vs. Output:	
Zero Scale (1920 Hz)	-10 Volts
Full Scale (9600 Hz)	10 Volts
Accuracy:*	0.1%
Gain Tempco.	55 PPM/ ^{o} C
Offset Tempco.	20 PPM/ ^{o} C
Input Response Time:	5%/1.0 V/8.4 ms
(% Of Span/Δ Volts/Δ Time)	63.2%/12.64 V/164.6 ms
	99.9%/19.98 V/1137.5 ms
Power Requirements:	
Module	15 V @ 15 mA
	-15 V @ 12 mA
Reference**	-5.000 V (± 2 mV)
Logic	5 V @ 1.6 mA
Ambient Temperature:	
Operating	0 To 70^{o} C
Storage	-25 To 85^{o} C

* May be improved by the use of the "Set Offset" or "Set Gain" commands in the OPTOMUX command set.

** The reference is derived from the ± 15 VDC and is provided by the OPTO 22 analog I/O mounting rack.

Opto 22
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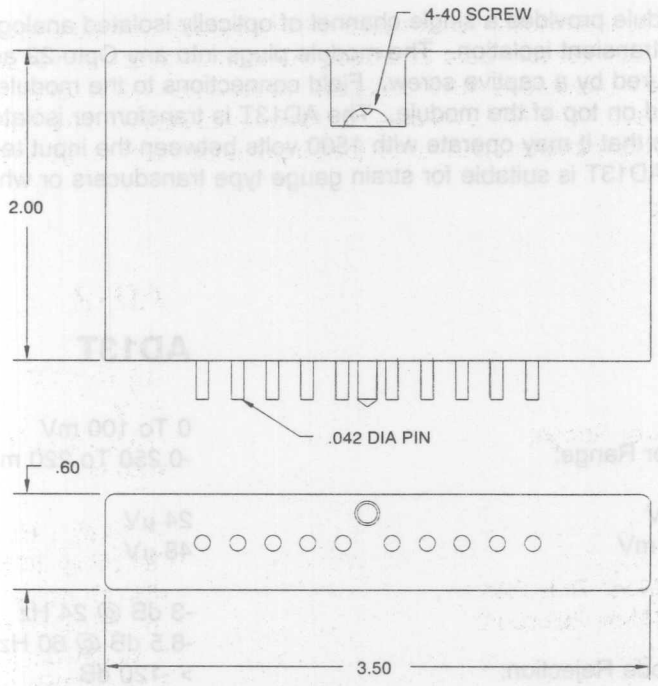
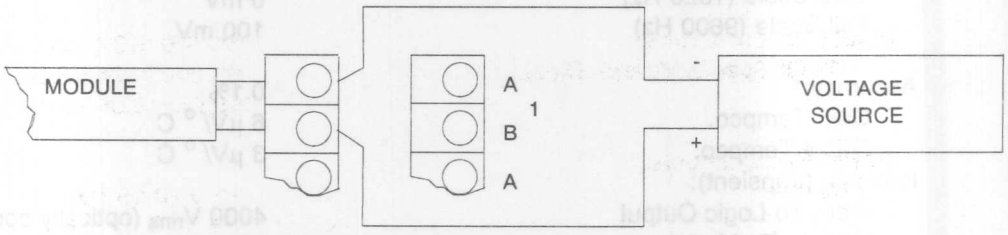
DIMENSIONS



SAMPLE WIRING DIAGRAM



THE VOLTAGE INPUT MODULES USE ONLY THE UPPER ROW A & B TERMINALS. "A" IS NEGATIVE (-) AND "B" IS POSITIVE (+). THE INPUT DEVICE IS THE VOLTAGE SOURCE.

0 TO 100 mV INPUT MODULE AD13T

DESCRIPTION

The AD13T module provides a single channel of optically isolated analog-to-digital conversion with 4000 V_{rms} transient isolation. The module plugs into any Opto 22 analog I/O mounting rack and is secured by a captive screw. Field connections to the module are made via terminals located on top of the module. The AD13T is transformer isolated from the analog power supply so that it may operate with 1500 volts between the input terminals and analog common. The AD13T is suitable for strain gauge type transducers or when galvanic isolation is required.

SPECIFICATIONS

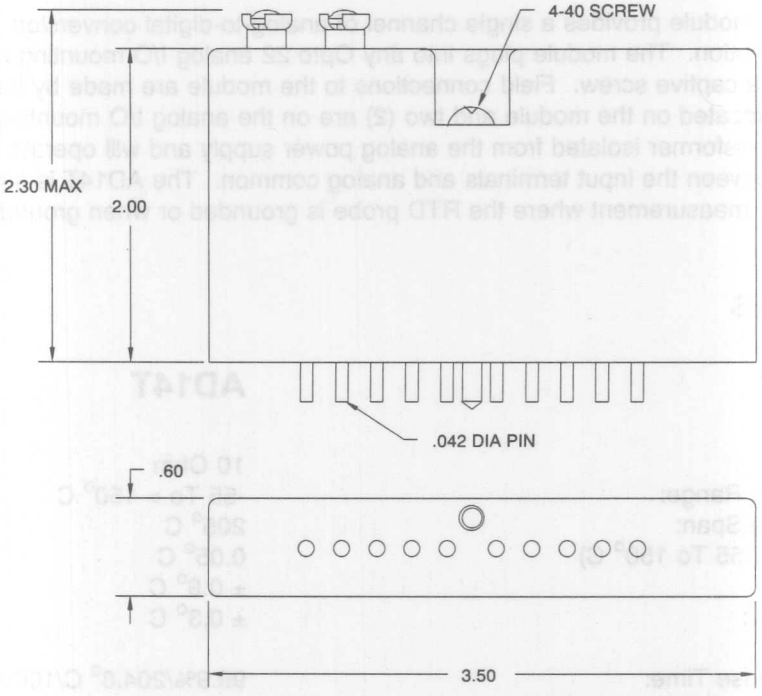
	AD13T
Input Range:	0 To 100 mV
Input Under/Over Range:	-0.250 To 220 mV
Resolution:	
0 To 100 mV	24 µV
100 To 200 mV	48 µV
Input Filtering:	-3 dB @ 24 Hz
	-8.5 dB @ 60 Hz
DC Common Mode Rejection:	> -120 dB
AC Common Mode Rejection:	> -120 dB
Input Response Time:	99.9%/99.9 mV/35 ms
(% Of Span/Δ mV/Δ Time)	
Input Impedance:	100 MegaOhms
Maximum Recommended Source Resistance:	10 K Ohms
Common Mode Input Range:	± 1500 V (both inputs to analog common)
Common Mode Input Impedance:	> 15 GigaOhms @ 1500 V
Maximum Differential Input	± 10 V
Input vs. Output:	
Zero Scale (1920 Hz)	0 mV
Full Scale (9600 Hz)	100 mV
Accuracy:*	0.1%
Gain Tempco.	6 µV/ ^{o} C
Offset Tempco.	3 µV/ ^{o} C
Isolation (transient):	
Input-To-Logic Output	4000 V_{rms} (optically coupled)
Module-To-Module	4000 V_{rms} (transformer coupled)
Power Requirements:	
Module	30 V (± 1.0 V) @ 35 mA**
Logic	5 V @ 1.6 mA
Ambient Temperature:	
Operating	0 To 70^{o} C
Storage	-25 To 85^{o} C

* May be improved by the use of the "Set Offset" or "Set Gain" commands in the OPTOMUX command set.

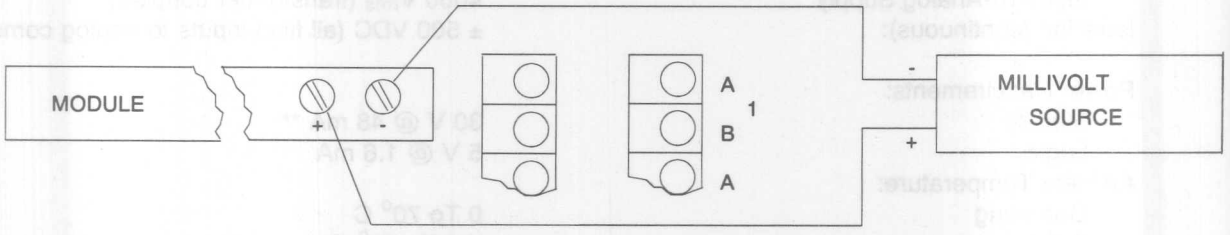
** The 30 volts is derived from the ± 15 VDC power supply connected to the Opto 22 analog I/O mounting rack.

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

DIMENSIONS



SAMPLE WIRING DIAGRAM



10 OHM RTD INPUT MODULE AD14T

DESCRIPTION

The AD14T module provides a single channel of analog-to-digital conversion with 4000 V_{rms} transient isolation. The module plugs into any Opto 22 analog I/O mounting rack and is secured by a captive screw. Field connections to the module are made by four (4) terminals, two (2) are located on the module and two (2) are on the analog I/O mounting rack. The AD14T is transformer isolated from the analog power supply and will operate with as much as 400 volts between the input terminals and analog common. The AD14T is suitable for temperature measurement where the RTD probe is grounded or when ground loop currents exist.

SPECIFICATIONS

	AD14T
RTD Input:	10 Ohm
Temperature Range:	-55 To > 150° C
Temperature Span:	205° C
Resolution: (-55 To 150° C)	0.05° C
Accuracy:*	± 0.6° C
Repeatability:	± 0.3° C
Input Response Time: (% Of Span/Δ Temp./Δ Time)	99.9%/204.8° C/100 ms
DC Common Mode Rejection:	> -120 dB
AC Common Mode Rejection @ 60 Hz:	> -120 dB
Excitation (Typical):	2.57 mA constant current
Maximum Lead Resistance:	> 200 Ohms (I+ and I- lead wire resistance)
Input vs. Output:	
Zero Scale (1920 Hz)	-55° C (6.918 Ohms)
Full Scale (9600 Hz)	150° C (14.82 Ohms)
Maximum Overrange (17280 Hz)	22.722 Ohms
Isolation (transient):	
Input-To-Output	4000 V_{rms} (optically coupled)
Input-To-Analog Supply	4000 V_{rms} (transformer coupled)
Isolation (continuous):	± 500 VDC (all field inputs to analog common)
Power Requirements:	
Module	30 V @ 48 mA **
Logic	5 V @ 1.6 mA
Ambient Temperature:	
Operating	0 To 70° C
Storage	-25 To 85° C

Note: A 2- or 3- wire RTD may be used. For best accuracy, a fourth wire from the module should be connected as close to the probe as possible, as shown in the Sample Wiring Diagram.

* When the AD14T is used with a 20 Ohm copper RTD (0.0385 Ohms/° C) and 4-wire hookup.

** The 30 volts is derived from the ± 15 VDC power supply connected to the Opto 22 analog I/O mounting rack

Opto 22
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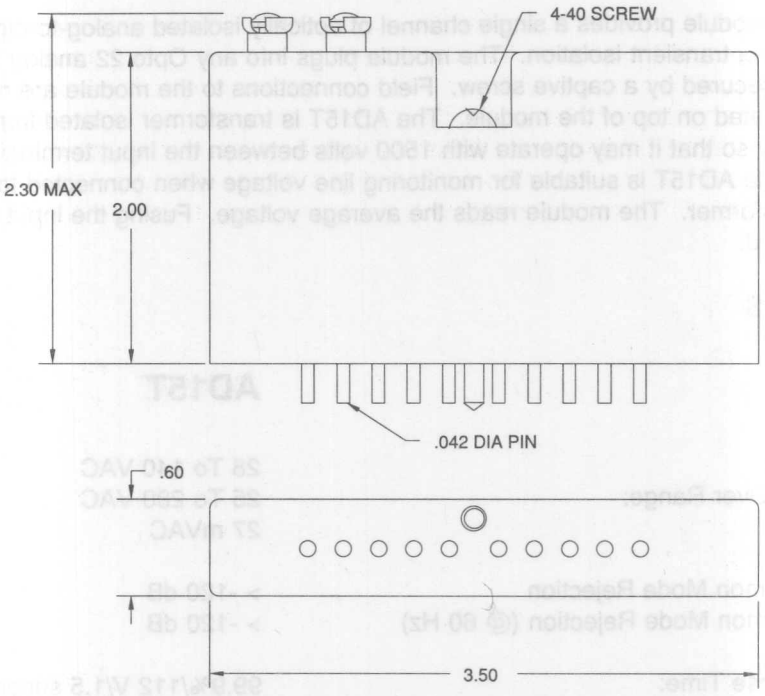
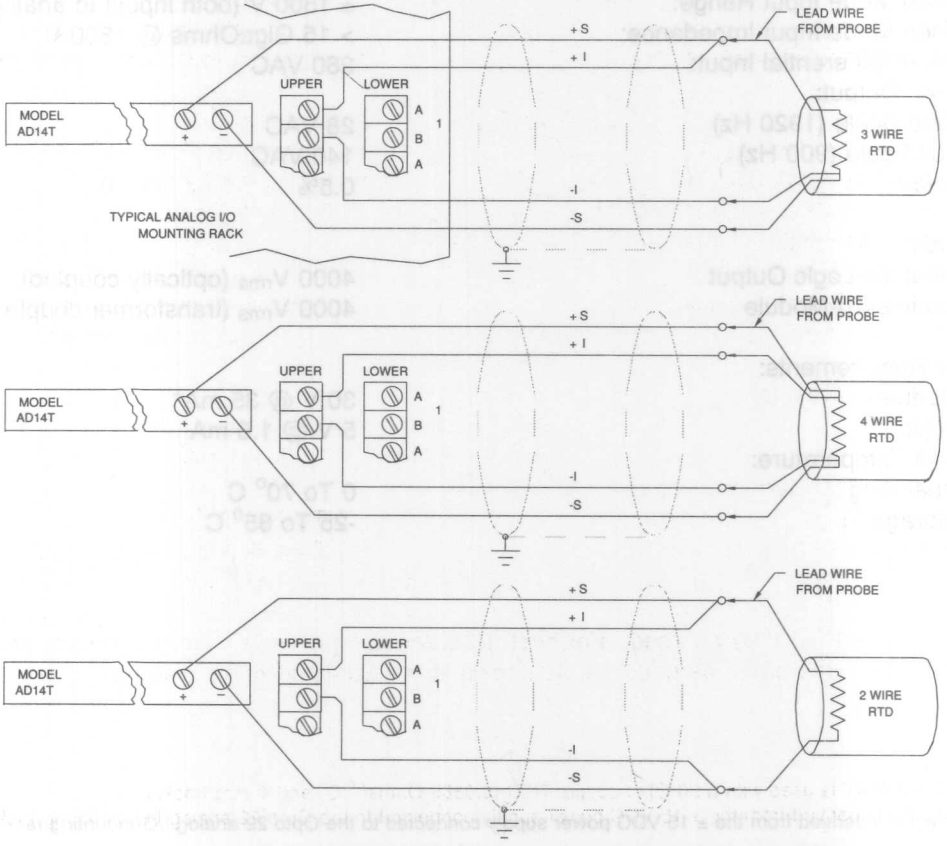
DIMENSIONS



SAMPLE WIRING DIAGRAM



28 TO 140 VAC INPUT MODULE AD15T

DESCRIPTION

The AD15T module provides a single channel of optically isolated analog-to-digital conversion with 4000 V_{rms} transient isolation. The module plugs into any Opto 22 analog I/O mounting rack and is secured by a captive screw. Field connections to the module are made via terminals located on top of the module. The AD15T is transformer isolated from the analog power supply so that it may operate with 1500 volts between the input terminals and analog common. The AD15T is suitable for monitoring line voltage when connected to the appropriate voltage transformer. The module reads the average voltage. Fusing the input lines is recommended.

SPECIFICATIONS

	AD15T
Input Range:	28 To 140 VAC
Input Under/Over Range:	25 To 280 VAC
Resolution:	27 mVAC
Input Filtering:	
DC Common Mode Rejection	> -120 dB
AC Common Mode Rejection (@ 60 Hz)	> -120 dB
Input Response Time: (% Of Span/Δ Volts/Δ Time)	99.9%/112 V/1.5 seconds
Input Impedance:	270 K Ohms
Common Mode Input Range:	± 1500 V (both inputs to analog common)
Common Mode Input Impedance:	> 15 GigaOhms @ 1500 V
Maximum Differential Input:	280 VAC
Input vs. Output:	
Zero Scale (1920 Hz)	28 VAC
Full Scale (900 Hz)	140 VAC
Accuracy:	0.5%
Isolation:	
Input-To-Logic Output	4000 V_{rms} (optically coupled)
Module-To-Module	4000 V_{rms} (transformer coupled)
Power Requirements:	
Module	30 V @ 35 mA*
Logic	5 V @ 1.6 mA
Ambient Temperature:	
Operating	0 To 70° C
Storage	-25 To 85° C

* The 30 volts is derived from the ± 15 VDC power supply connected to the Opto 22 analog I/O mounting rack.

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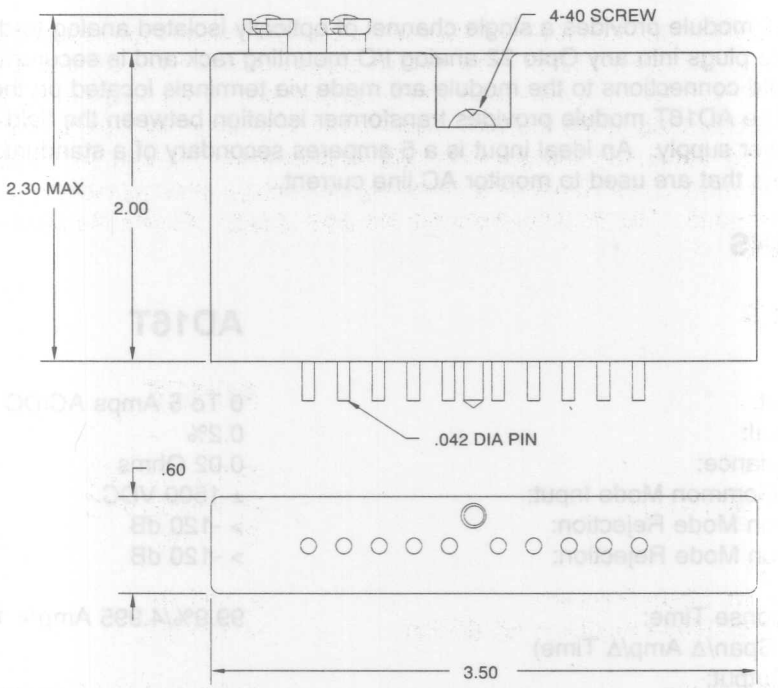
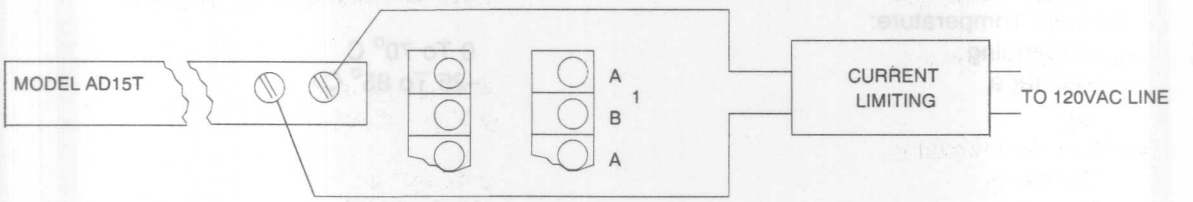
DIMENSIONS



SAMPLE WIRING DIAGRAM



0 TO 5 AMP CURRENT INPUT MODULE AD16T

DESCRIPTION

The AD16T module provides a single channel of optically isolated analog-to-digital conversion. The module plugs into any Opto 22 analog I/O mounting rack and is secured by a captive screw. Field connections to the module are made via terminals located on the top of the module. The AD16T module provides transformer isolation between the field terminals and the analog power supply. An ideal input is a 5 amperes secondary of a standard current transformers that are used to monitor AC line current.

SPECIFICATIONS

	AD16T
Signal Input:	0 To 5 Amps AC/DC
DC Reversal:	0.2%
Input Impedance:	0.02 Ohms
Maximum Common Mode Input:	± 1500 VDC
DC Common Mode Rejection:	> -120 dB
AC Common Mode Rejection:	> -120 dB
Input Response Time: (% Of Span/Δ Amp/Δ Time)	99.9%/4.995 Amp/< 100 ms
Input vs. Output:	
Zero Scale (1920 Hz)	0 Amps
Full Scale (9600 Hz)	5 Amps
Resolution:	1.2 mA
Calibrated Accuracy:	0.5%
Isolation (Transient):	
Input-To-Output	4000 V_{rms}
Input-To-Analog Supply	4000 V_{rms}
Isolation (Continuous):	1500 VDC
Power Requirements:	
Module	30 V @ 35 mA*
Logic	5 V @ 1.6 mA
Ambient Temperature:	
Operating	0 To 70° C
Storage	-25 To 85° C

* The 30 volts is derived from the ± 15 VDC power supply connected to the Opto 22 analog I/O mounting rack.

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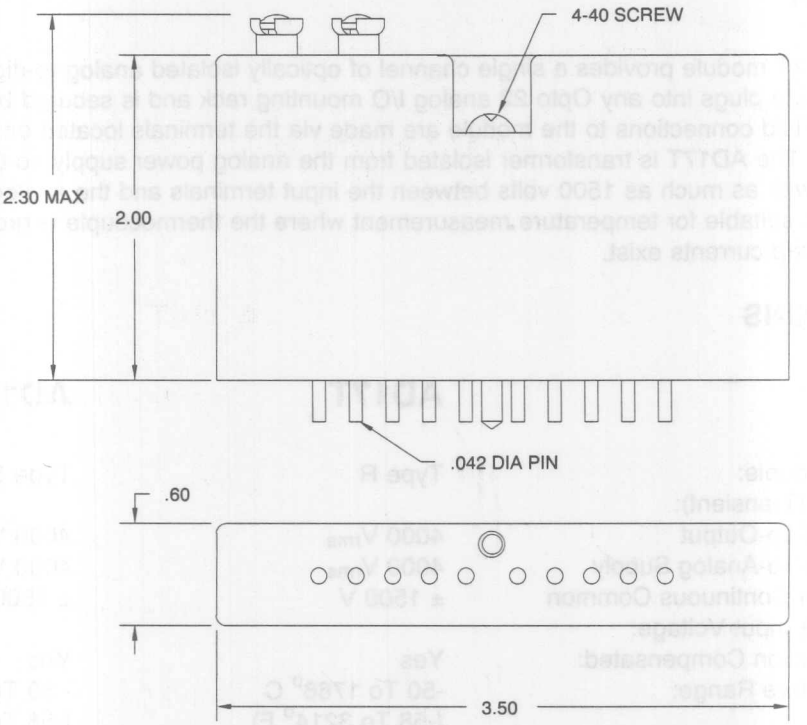
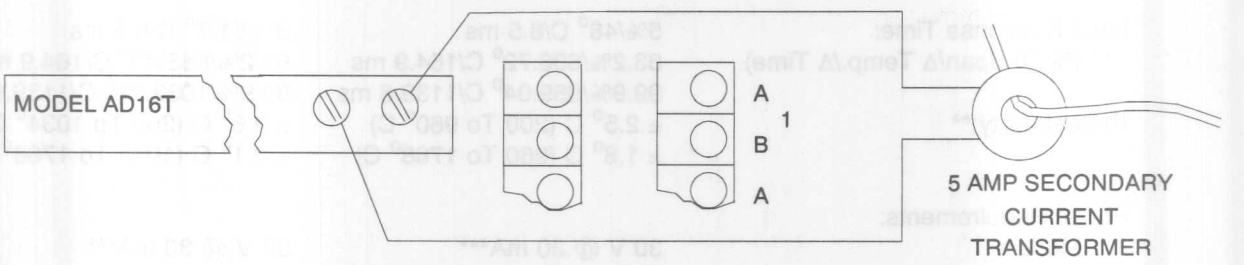
DIMENSIONS



SAMPLE WIRING DIAGRAM



CAUTION: OUTPUT LEADS OF CURRENT TRANSFORMER SHOULD BE SHORTED TOGETHER AT ALL TIMES WHEN MODULE IS NOT CONNECTED.

TYPE R OR S THERMOCOUPLE INPUT MODULE — AD17T

DESCRIPTION

The AD17T module provides a single channel of optically isolated analog-to-digital conversion. The module plugs into any Opto 22 analog I/O mounting rack and is secured by a captive screw. Field connections to the module are made via the terminals located on the top of the module. The AD17T is transformer isolated from the analog power supply so that it may operate with as much as 1500 volts between the input terminals and the analog common. The AD17T is suitable for temperature measurement where the thermocouple is grounded or when ground loop currents exist.

SPECIFICATIONS

	AD17T	AD17T
Thermocouple:	Type R	Type S
Isolation (Transient):		
Input-To-Output	4000 V_{rms}	4000 V_{rms}
Input-To-Analog Supply	4000 V_{rms}	4000 V_{rms}
Maximum Continuous Common Mode Input Voltage:	± 1500 V	± 1500 V
Cold Junction Compensated:	Yes	Yes
Temperature Range:	-50 To 1768° C (-58 To 3214° F)	- 50 To 1768° C (-58 To 3214° F)
Input vs. Output:*		
Zero Scale (1920 Hz)	0° C	0° C
Full Scale (9600 Hz)	960° C	1034° C
Average Resolution:	0.23° C (200 To 960° C) 0.35° C (960 To 1768° C)	0.25° C (200 To 1034° C) 0.48° C (1034 To 1768° C)
Accuracy:	± 5.0° C (200 To 960° C) ± 3.5° C (960 To 1768° C)	± 5.2° C (200 To 1034° C) ± 4.2° C (1034 To 1768° C)
Input Response Time:	5%/48° C/8.5 ms	5%/51.7° C/8.5 ms
(% Of Span/Δ Temp./Δ Time)	63.2%/606.72° C/164.9 ms 99.9%/959.04° C/1139.8 ms	63.2%/653.49° C/164.9 ms 99.9%/1032.97° C/1139.8 ms
Repeatability:**	± 2.5° C (200 To 960° C) ± 1.8° C (960 To 1768° C)	± 2.6° C (200 To 1034° C) ± 2.1° C (1034 To 1768° C)
Power Requirements:		
Module	30 V @ 30 mA***	30 V @ 30 mA***
Logic	5 V @ 1.6 mA	5 V @ 1.6 mA
Ambient Temperature:		
Operating	0 To 70° C	0 To 70° C
Storage	-25 To 85° C	-25 To 85° C

* A tested algorithm for linearization is included.

** Accuracy may be improved by the use of "Set Offset" and "Set Gain" commands in the OPTOMUX command set.

*** The 30 volts is derived from the ± 15 VDC power supply connected to the Opto 22 analog I/O mounting rack.

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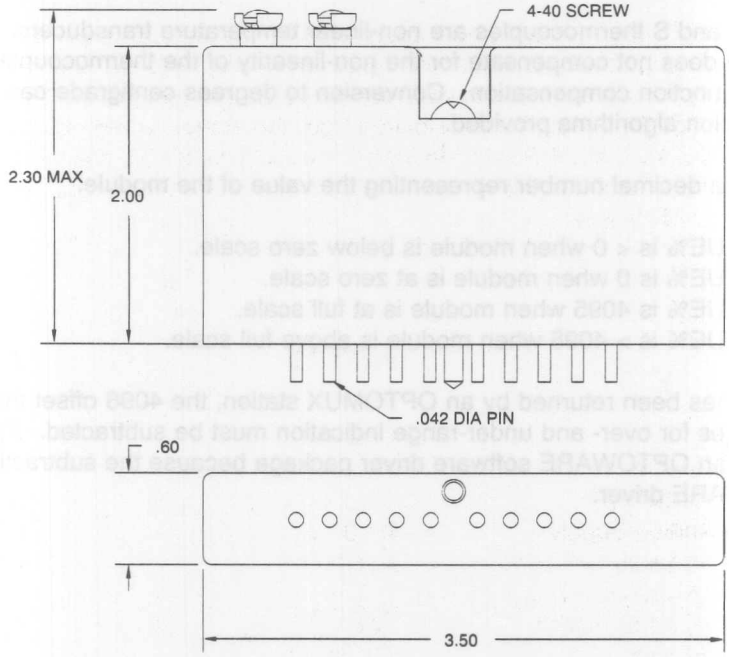
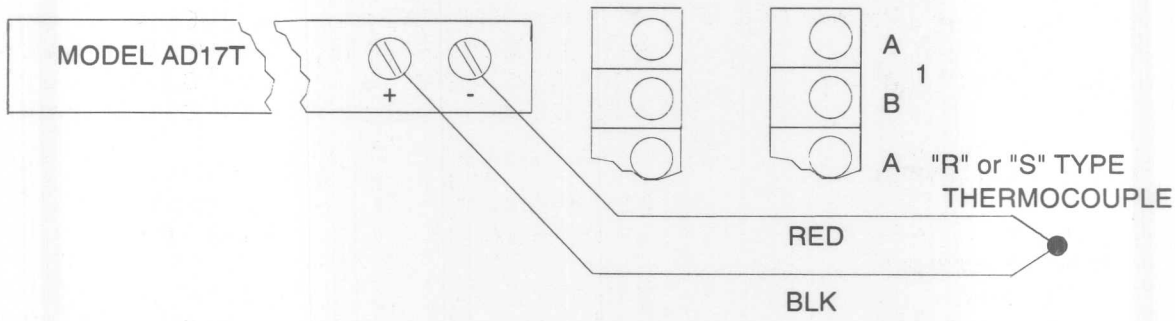
DIMENSIONS



SAMPLE WIRING DIAGRAM



LINEARIZATION ALGORITHMS

The Type R and S thermocouples are non-linear temperature transducers. The AD17T module is linear and does not compensate for the non-linearity of the thermocouples. The module has built-in cold junction compensation. Conversion to degrees centigrade can be performed using the linearization algorithms provided.

VALUE% is a decimal number representing the value of the module:

VALUE% is < 0 when module is below zero scale.
VALUE% is 0 when module is at zero scale.
VALUE% is 4095 when module is at full scale.
VALUE% is > 4095 when module is above full scale.

If the value has been returned by an OPTOMUX station, the 4096 offset that OPTOMUX adds to input values for over- and under-range indication must be subtracted. This is not necessary when using an OPTOWARE software driver package because the subtraction is performed by the OPTOWARE driver.

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LINEARIZATION ALGORITHMS (For Type R Thermocouple)

```
100   '*      THIS IS A SAMPLE SUBROUTINE TO CONVERT THE OUTPUT
110   '*      OF A TYPE R THERMOCOUPLE AND AD17T TO DEGREES
120   '*      CENTIGRADE
130   ' *
140   '*      FROM -50 TO 0 DEGREES C - WITHIN ± 12.1 DEGREES C
150   '*      FROM 0 TO 350 DEGREES C - WITHIN ± 3.6 DEGREES C
160   '*      FROM 350 TO 1710 DEGREES C - WITHIN ± 0.2 DEGREES C
170   '*
180   '*      VALUE% IS THE DECIMAL VALUE RETURNED FROM THE AD17T
190   '*
200   CNTS = VALUE% * 2.43663
210   '*
220   '*      CNTS IS GREATER THAN 237 DEGREES C
230   IF CNTS > 1802 THEN GOTO 240
240   '*
250   '*      COEFFICIENTS FOR -50 TO 237 DEGREES C
260   A0 = 0
270   A1 = 0.1625144
280   A2 = -2.045438E-05
290   A3 = 2.540494E-09
300   A4 = -1.17679E-13
310   GOTO 310
320   '*
330   '*      COEFFICIENTS FOR 237 TO 1768 DEGREES C
340   A0 = 46.67453
350   A1 = 0.1117991
360   A2 = -2.565926E-06
370   A3 = 5.347317E-11
380   A4 = 0
390   '*
400   '*      CALCULATE TEMPERATURE
410   TEMP1 = A0 + A1 * CNTS + A2 * CNTS^2 + A3 * CNTS^3
420   TEMP = TEMP1 + A4 * CNTS^4
430   '*
440   '*      ROUND OFF TO NEAREST TENTH DEGREE
450   TEMP = (CINT(TEMP*10))/10
460   '*
470   PRINT USING "####.#" ; TEMP
480   RETURN
```

LINEARIZATION ALGORITHMS (For Type S Thermocouple)

```
100   '*      THIS IS A SAMPLE SUBROUTINE TO CONVERT THE OUTPUT
110   '*      OF A TYPE S THERMOCOUPLE AND AD17T TO DEGREES
120   '*      CENTIGRADE
130   '*
140   '*      FROM -50 TO 0 DEGREES C WITHIN ± 10.2 DEGREES C
150   '*      FROM 0 TO 400 DEGREES C WITHIN ± 2.7 DEGREES C
160   '*      FROM 400 TO 1680 DEGREES C WITHIN ± 0.6 DEGREES C
170   '*
180   '*      VALUE% IS THE DECIMAL VALUE RETURNED FROM THE AD17T
190   '*
200   CNTS = VALUE% * 2.43663
210   '*
220   '*      CNTS IS GREATER THAN 167 DEGREES CENTIGRADE
230   IF CNTS > 1166 THEN GOTO 340
240   '*
250   '*      COEFFICIENTS FOR -50 TO 167 DEGREES C
260   A0 = 0
270   A1 = 0.1641405
280   A2 = -2.024176E-05
290   A3 = 2.784973E-09
300   A4 = -1.41721E-13
310   GOTO 310
320   '*
330   '*      COEFFICIENTS FOR 167 TO 1768 DEGREES C
340   A0 = 30.1319
350   A1 = 0.1215561
360   A2 = -2.752449E-06
370   A3 = 6.475822E-11
380   A4 = 0
390   '*
400   '*      CALCULATE TEMPERATURE
410   TEMP1 = A0 + A1 * CNTS + A2 * CNTS^2 + A3 * CNTS^3
420   TEMP = TEMP1 + A4 * CNTS^4
430   '*
440   '*      ROUND OFF TO NEAREST TENTH DEGREE
450   TEMP =(CINT(TEMP * 10))/10
460   '*
470   PRINT USING "####.# " ; TEMP
480   RETURN
```


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TYPE T THERMOCOUPLE INPUT MODULE

AD18T

DESCRIPTION

The AD18T module provides a single channel of optically isolated analog-to-digital conversion. The module plugs into any Opto 22 analog I/O mounting rack and is secured by a captive screw. Field connections to the module are made via the terminals located on the top of the module. The AD18T is transformer isolated from the analog power supply so that it may operate with as much as 1500 volts between the input terminals and the analog common. The AD18T is suitable for temperature measurement where the thermocouple is grounded or when ground loop currents exist.

SPECIFICATIONS

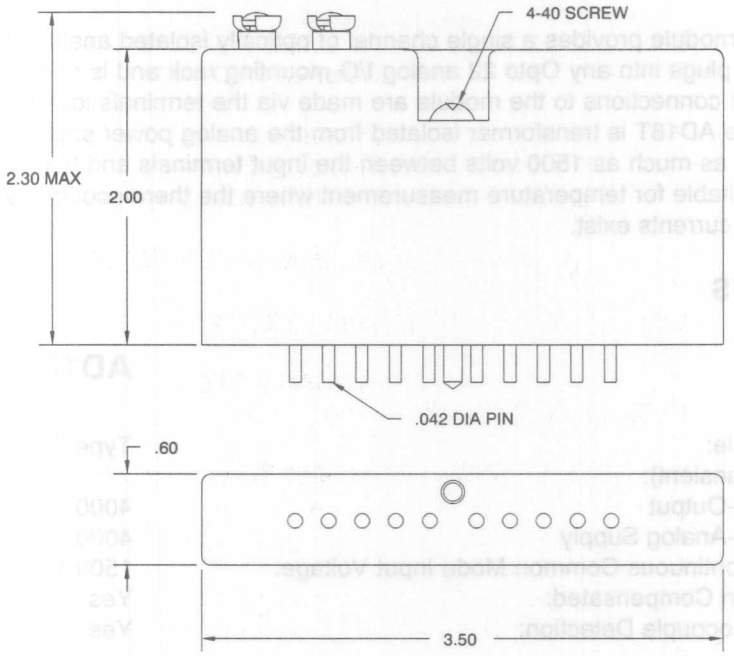
	AD18T
Thermocouple:	Type T
Isolation (Transient):	
Input-To-Output	4000 V_{rms}
Input-To-Analog Supply	4000 V_{rms}
Maximum Continuous Common Mode Input Voltage:	1500 V
Cold Junction Compensated:	Yes
Open Thermocouple Detection:	Yes
Temperature Range:	-200 To 400° C (-328 To 752° F)
Input vs. Output:*	
Zero Scale (1920 Hz)	-200° C
Full Scale (9600 Hz)	224° C
Average Resolution:	
-200 To 244° C	0.1° C
244 To 400° C	0.14° C
Accuracy:**	
-100 To 224° C	± 3.0° C
224 To 400° C	± 2.0° C
Input Response Time: % Of Span/Δ Temp./Δ Time)	5%/21.2° C/5.1 ms 63.2%/267.968° C/99.6 ms 99.9%/423.576° C/688.4 ms
Repeatability:	
-100 To 0° C	± 1.0° C
0 To 224° C	± 0.6° C
224 To 400° C	± 0.4° C
Power Requirements:	
Module	30 V @ 30 mA***
Logic	5 V @ 1.6 mA
Ambient Temperature:	
Operating	0 To 70° C
Storage	-25 To 85° C

* A tested algorithm for linearization is included.

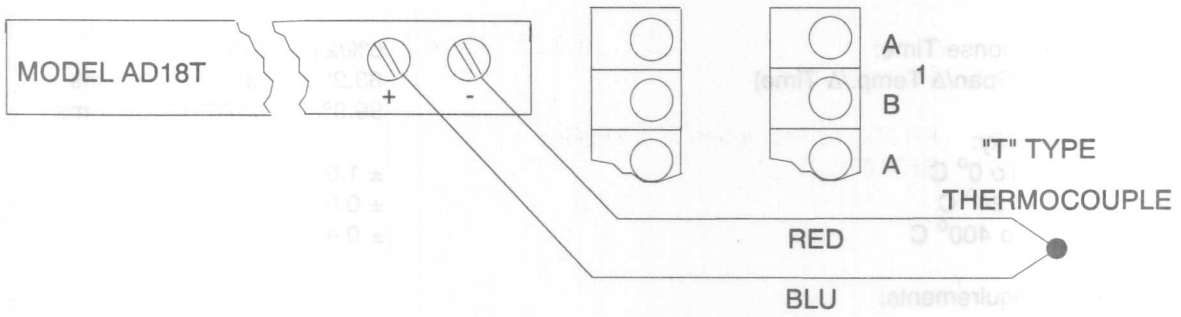
** Accuracy may be improved by the use of "Set Offset" and "Set Gain" commands in the OPTOMUX command set.

*** The 30 volts is derived from the ± 15 VDC power supply connected to the Opto 22 analog I/O mounting rack.

DIMENSIONS



SAMPLE WIRING DIAGRAM



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LINEARIZATION ALGORITHMS

```
100   '*      THIS IS A SAMPLE SUBROUTINE TO CONVERT THE OUTPUT OF A
110   '*      TYPE T THERMOCOUPLE AND AD18T TO DEGREES CENTIGRADE
120   '*
130   '*      FROM -200 TO -32 DEGREES C - WITHIN ± 0.3 DEGREES C
140   '*      FROM -32 TO 0 DEGREES C - WITHIN ± 0.5 DEGREES C
150   '*      FROM 0 TO 400 DEGREES C - WITHIN ± 0.2 DEGREES C
160   '*
170   '*      VALUE% IS THE DECIMAL VALUE RETURNED FROM THE AD18T
180   '*
190   CNTS = (VALUE% * 3.951286) - 5602.92
200   '*
210   '*      CNTS IS GREATER THAN 0 DEG C
220   IF CNTS > 0 THEN GOTO 330
230   '*
240   '*      COEFFICIENTS FOR -200 TO 0 DEGREES C
250   A0 = 0
260   A1 = 2.383709E-02
270   A2 = -2.987884E-06
280   A3 = -7.194581E-10
290   A4 = -1.004194E-13
300   GOTO 300
310   '*
320   '*      COEFFICIENTS FOR 0 TO 400 DEGREES C
330   A0 = 0
340   A1 = 0.0256613
350   A2 = -6.195487E-07
360   A3 = 2.218164E-11
370   A4 = -3.55009E-16
380   '*
390   '*      CALCULATE TEMPERATURE
400   TEMP1 = A0 + A1 * CNTS + A2 * CNTS^2 + A3 * CNTS^3
420   TEMP = TEMP1 + A4 * CNTS^4
430   '*
440   '*      ROUND OFF TO NEAREST TENTH DEGREE C
450   TEMP = (CINT(TEMP*10))/10
460   '*
470   PRINT USING "#####.#" ; TEMP
480   RETURN
```

TYPE E THERMOCOUPLE INPUT MODULE

AD19T

DESCRIPTION

The AD19T module provides a single channel of optically isolated analog-to-digital conversion. The module plugs into any Opto 22 analog I/O mounting rack and is secured by a captive screw. Field connections to the module are made via the terminals located on the top of the module. The AD19T is transformer isolated from the analog power supply so that it may operate with as much as 1500 volts between the input terminals and the analog common. The AD19T is suitable for temperature measurement where the thermocouple is grounded or when ground loop currents exist.

SPECIFICATIONS

	AD19T
Thermocouple:	Type E
Isolation (Transient):	
Input-To-Output	4000 V_{rms}
Input-To-Analog Supply	4000 V_{rms}
Maximum Continuous Common Mode Input Voltage:	± 1500 V
Cold Junction Compensated:	Yes
Open Thermocouple Detection:	Yes
Temperature Range:	-100 To 900° C (-148 To 1652° F)
Input vs. Output:*	
Zero Scale (1920 Hz)	-100° C
Full Scale (9600 Hz)	435° C
Average Resolution:	
-100 To 435° C	0.13° C
435 To 900° C	0.23° C
Accuracy:**	± 3.0° C
Input Response Time:	5%/26.75° C/2.3 ms
(% Of Span/Δ Temp./Δ Time)	63.2%/338.12° C/44.2 ms
	99.9%/534.465° C/305.5 ms
Repeatability:	
-100 To 0° C	± 0.8° C
0 To 435° C	± 0.6° C
435 To 900° C	± 0.5° C
Power Requirements:	
Module	30 V @ 30 mA***
Logic	5 V @ 1.6 mA
Ambient Temperature:	
Operating	0 To 70° C
Storage	25 To 85° C

* A tested algorithm for linearization is included

** Accuracy may be improved by the use of "Set Offset" and "Set Gain" commands in the OPTOMUX command set.

*** The 30 volts is derived from the ± 15 VDC power supply connected to the Opto 22 analog I/O mounting rack.

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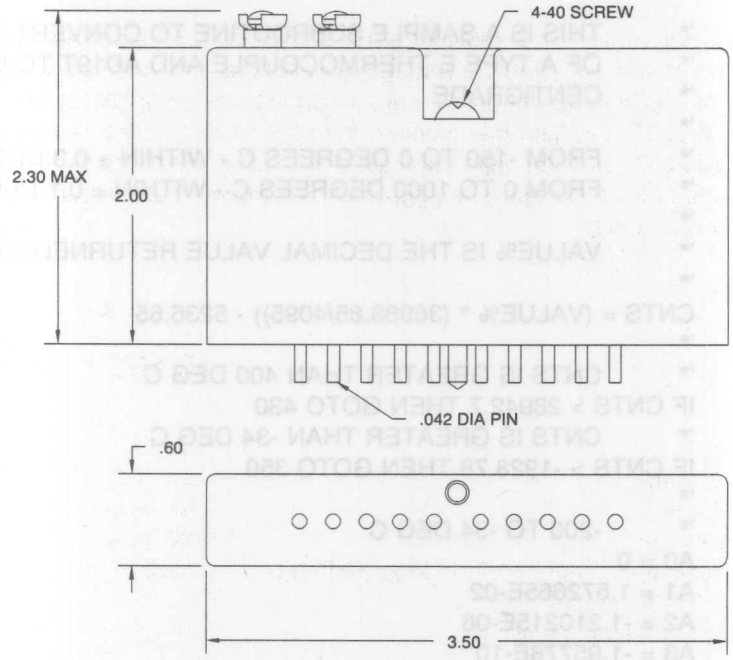
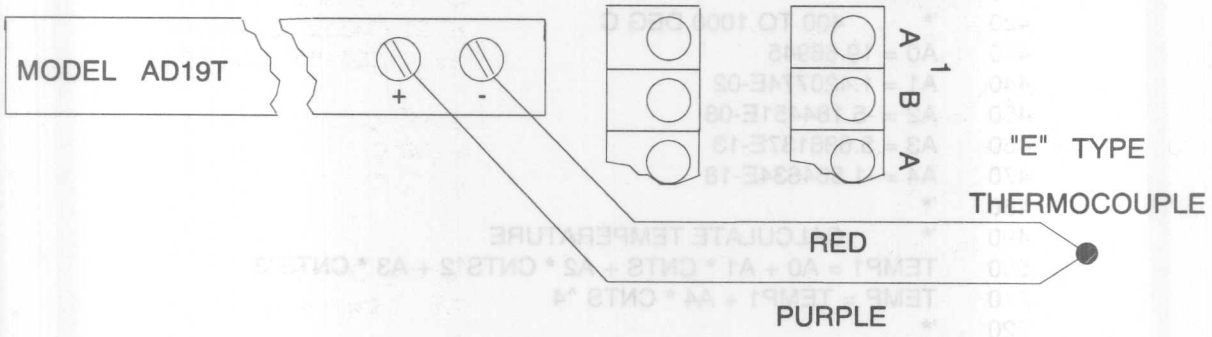
DIMENSIONS



SAMPLE WIRING DIAGRAM



LINEARIZATION ALGORITHMS

```
100   '*      THIS IS A SAMPLE SUBROUTINE TO CONVERT THE OUTPUT
110   '*      OF A TYPE E THERMOCOUPLE AND AD19T TO DEGREES
120   '*      CENTIGRADE
130   '*
140   '*      FROM -150 TO 0 DEGREES C - WITHIN ± 0.3 DEGREES C
150   '*      FROM 0 TO 1000 DEGREES C - WITHIN ± 0.1 DEGREES C
160   '*
170   '*      VALUE% IS THE DECIMAL VALUE RETURNED FROM THE AD19T
180   '*
190   CNTS = (VALUE% * (36988.85/4095)) - 5236.65
200   '*
210   '*      CNTS IS GREATER THAN 400 DEG C
220   IF CNTS > 28942.7 THEN GOTO 430
230   '*      CNTS IS GREATER THAN -34 DEG C
240   IF CNTS > -1928.78 THEN GOTO 350
250   '*
260   '*      -200 TO -34 DEG C
270   A0 = 0
280   A1 = 1.572665E-02
290   A2 = -1.210215E-06
300   A3 = -1.95778E-10
310   A4 = -1.66963E-14
320   GOTO 500
330   '*
340   '*      -34 TO 400 DEG C
350   A0 = 0
360   A1 = 1.702253E-02
370   A2 = -2.209724E-07
380   A3 = 5.480931E-12
390   A4 = -5.766989E-17
400   GOTO 500
410   '*
420   '*      400 TO 1000 DEG C
430   A0 = 19.66945
440   A1 = 1.420774E-02
450   A2 = -5.184451E-08
460   A3 = 5.636137E-13
470   A4 = -1.564634E-18
480   '*
490   '*      CALCULATE TEMPERATURE
500   TEMP1 = A0 + A1 * CNTS + A2 * CNTS^2 + A3 * CNTS^3
510   TEMP = TEMP1 + A4 * CNTS ^4
520   '*
530   '*      ROUND OFF TO NEAREST TENTH DEGREE C
540   TEMP = (CINT (TEMP * 10))/10
550   '*
560   PRINT USING "####.#" ; TEMP
570   RETURN
```


Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

DESCRIPTION

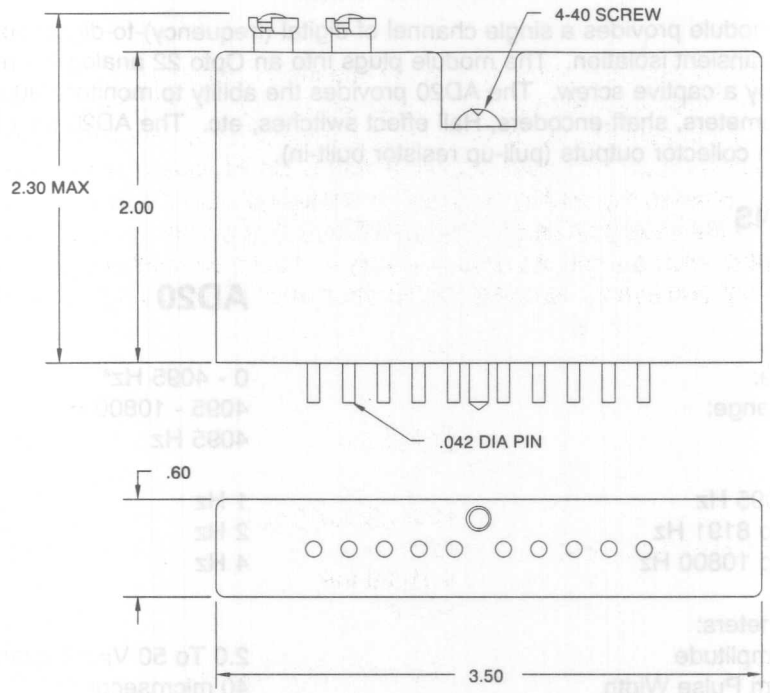
The AD20 module provides a single channel of digital (frequency)-to-digital conversion with 4000 V_{rms} transient isolation. The module plugs into an Opto 22 analog I/O mounting rack and is secured by a captive screw. The AD20 provides the ability to monitor frequencies from digital tachometers, shaft-encoders, Hall effect switches, etc. The AD20 may be driven from TTL or open collector outputs (pull-up resistor built-in).

SPECIFICATIONS

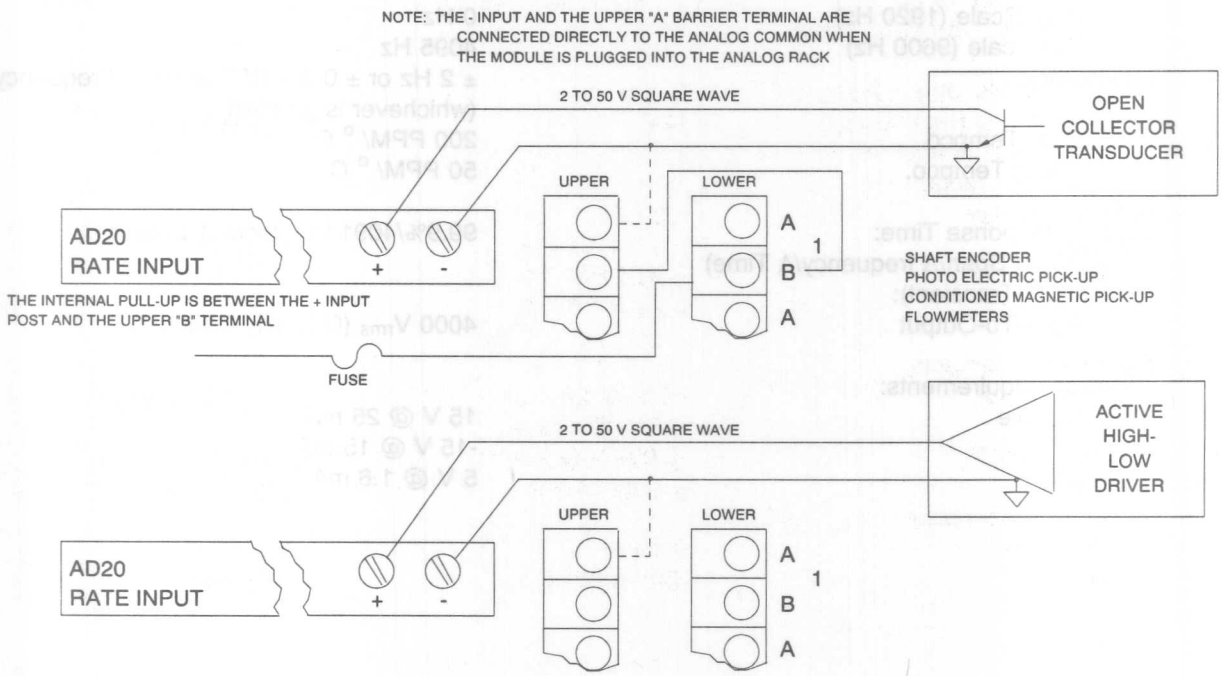
	AD20
Input Range:	0 - 4095 Hz*
Input Overrange:	4095 - 10800 Hz
Span:	4095 Hz
Resolution:	
0 To 4095 Hz	1 Hz
4096 To 8191 Hz	2 Hz
8192 To 10800 Hz	4 Hz
Input Parameters:	
Input Amplitude	2.0 To 50 V_{P-P} Square Wave
Minimum Pulse Width	40 microseconds
Input Impedance	50 K Ohms (-Input To +Input)
Loop Supply Voltage:	2.5 - 50 V
Pull-Up Resistor:	10 K Ohms
Input vs. Output:	
Zero Scale (1920 Hz)	0 Hz
Full Scale (9600 Hz)	4095 Hz
Accuracy:	± 2 Hz or ± 0.5% Of The Input Frequency (whichever is greater)
Gain Tempco.	200 PPM/ ^{o} C
Offset Tempco.	50 PPM/ ^{o} C
Input Response Time: (% Of Span/Δ frequency/Δ Time)	99.9%/4091 frequency/1 second
Isolation (Transient):	
Input-To-Output	4000 V_{rms} (Optically Coupled)
Power Requirements:	
Module	15 V @ 25 mA
	-15 V @ 15 mA
Logic	5 V @ 1.6 mA

* Below 10 Hz, it may be necessary to average the readings.

DIMENSIONS



SAMPLE WIRING DIAGRAM



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4 TO 20 mA CURRENT OUTPUT MODULE

DA3
DA3T

DESCRIPTION

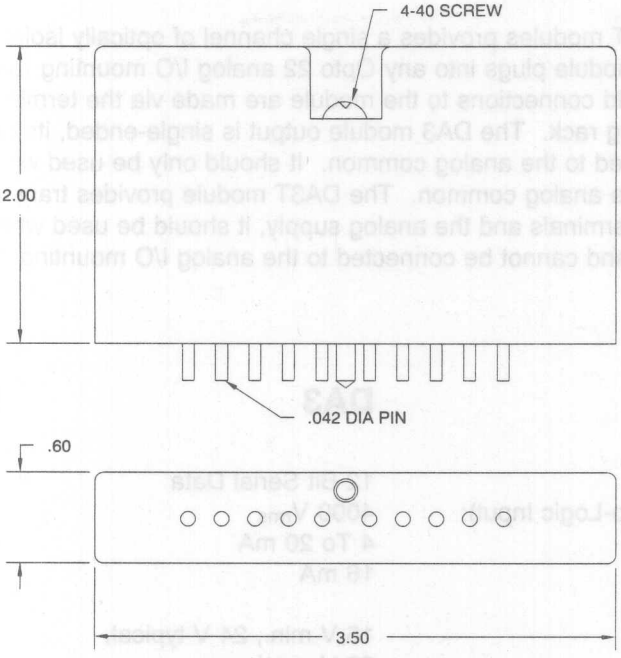
The DA3 and DA3T modules provides a single channel of optically isolated digital-to-analog conversion. The module plugs into any Opto 22 analog I/O mounting rack and is secured by a captive screw. Field connections to the module are made via the terminal strip located on the analog I/O mounting rack. The DA3 module output is single-ended, its negative (-) output terminal is connected to the analog common. It should only be used when the loop supply can be connected to the analog common. The DA3T module provides transformer isolation between the field terminals and the analog supply, it should be used when the current output must be "floating" and cannot be connected to the analog I/O mounting rack common.

SPECIFICATIONS

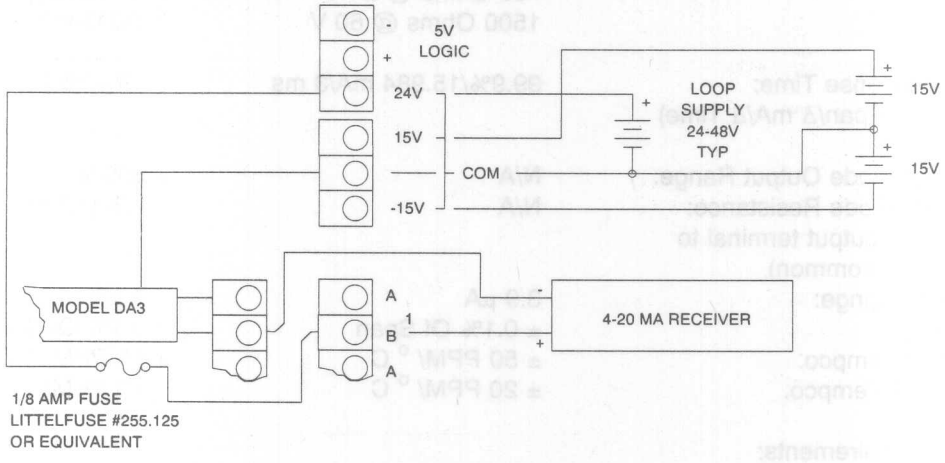
	DA3	DA3T
Input Data:	12 Bit Serial Data	12 Bit Serial Data
Isolation (Output-To-Logic Input):	4000 V_{rms}	4000 V_{rms}
Signal Output:	4 To 20 mA	4 To 20 mA
Span:	16 mA	16 mA
Loop Supply (DC):	15 V min., 24 V typical, 60 V maximum	15 V min., 24 V typical, 60 V maximum
Max Load Resistance vs. Loop Supply:	450 Ohms @ 15 V 750 Ohms @ 24 V 1500 Ohms @ 60 V	450 Ohms @ 15 V 750 Ohms @ 24 V 1500 Ohms @ 60 V
Input Response Time: (% Of Span/Δ mA/Δ Time)	99.9%/15.984 mA/3 ms	99.9%/15.984 mA/3 ms
Common Mode Output Range:	N/A	± 500 V
Common Mode Resistance: (either output terminal to analog common)	N/A	15 GigaOhms
One Bit Change:	3.9 μA	3.9 μA
Accuracy:	± 0.1% Of Span	± 0.1% Of Span
Gain Tempco.	± 50 PPM/ ^{o} C	± 25 PPM/ ^{o} C
Offset Tempco.	± 20 PPM/ ^{o} C	± 20 PPM/ ^{o} C
Power Requirements:		
Output Side*	15 V @ 20 mA -15 V @ 10 mA	30 V @ 22 mA***
Reference**	-5.000 V (± 2 mV)	Internal
Logic	5 V @ 24 mA	5 V @ 24 mA
Ambient Temperature:		
Operating	0 To 70^{o} C	0 To 70^{o} C
Storage	-25 To 85^{o} C	-25 To 85^{o} C

* For the module only, does not include the 4 - 20 mA loop current.
** The reference is derived from the ± 15 VDC and is provided by the Opto 22 analog I/O mounting rack.
*** The 30 volts is derived from the ± 15 VDC power supply connected to the Opto 22 analog I/O mounting rack.

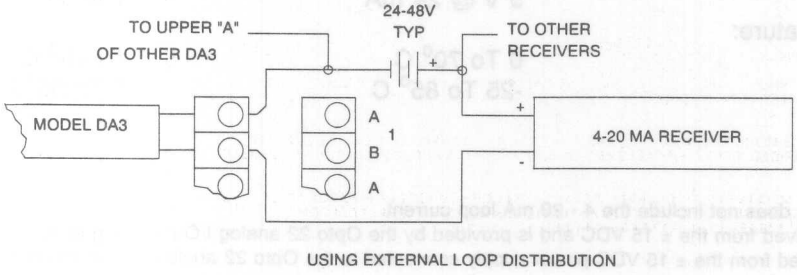
DIMENSIONS



SAMPLE WIRING DIAGRAM (For DA3)



USING LOOP SOURCE DISTRIBUTION



USING EXTERNAL LOOP DISTRIBUTION

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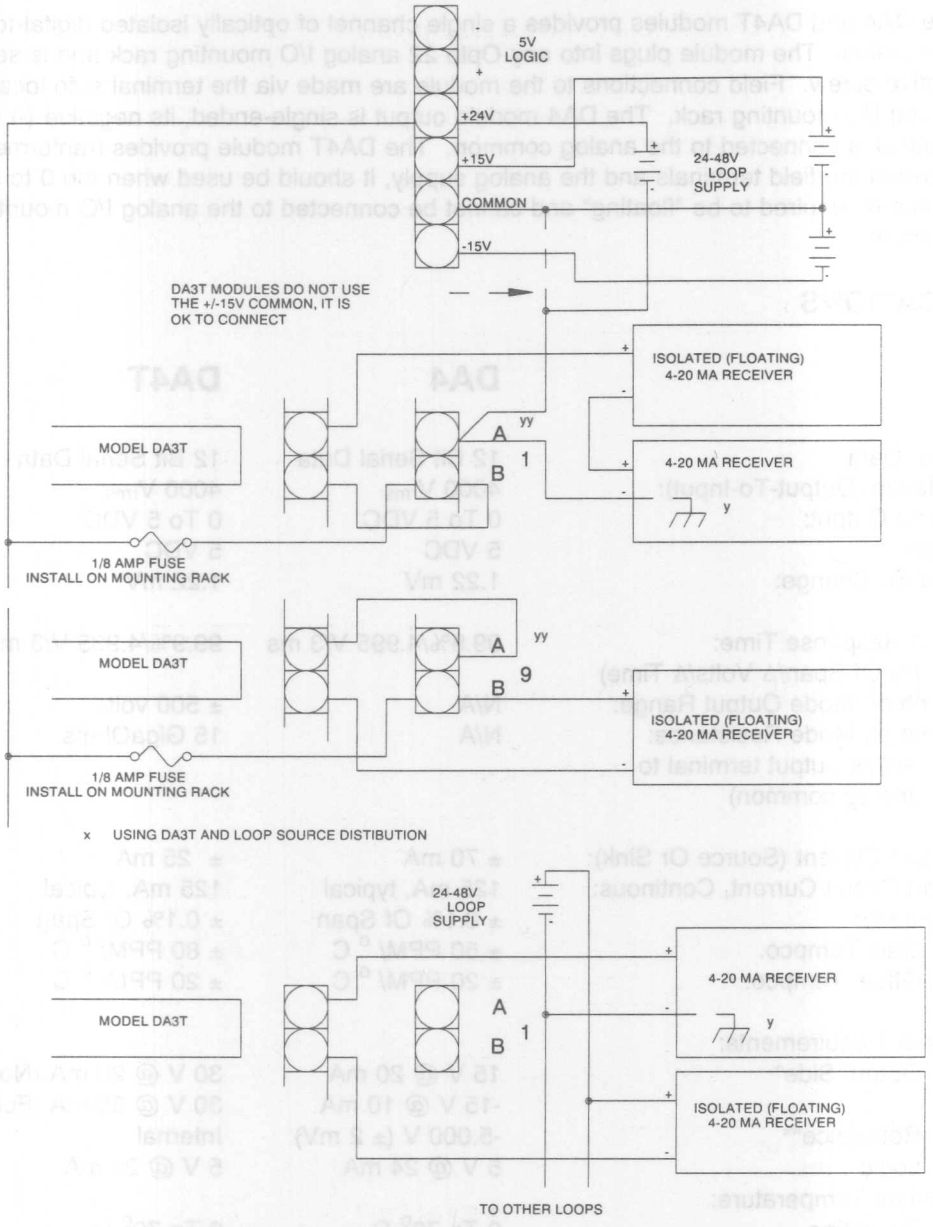
SAMPLE WIRING DIAGRAM (For DA3T)



x USING DA3T AND LOOP SOURCE DISTIBUTION

PUTTING THE DA3T IN THE MIDDLE OF A 4-20 MA LOOP.

y ONLY 1 GROUNDED 4-20 RECEIVER MAY BE PLACED IN EACH INDIVIDUAL LOOP

yy ALL OF THE LOWER "A" TERMINALS ARE BUSSED ON THE ANALOG MOUNTING RACKS

THE LOOP SHOULD ONLY BE GROUNDED AT THE - SIDE OF THE 24V LOOP SUPPLY
THERE CAN ONLY BE ONE GROUNDED RECEIVER PER 4-20 MA LOOP

IF THERE IS MORE THAN ONE RECEIVER PER 4-20 MA LOOP, ONLY ONE CAN BE GROUNDED
THE GROUNDED INPUT (TYPICALY THE "-" INPUT) MUST BE CONNECTED TO THE 24V GROUND

x THERE IS NO CHANNEL TO CHANNEL ISOLATION IF LOOP SOURCE DISTRIBUTION IS USED. IF CHANNEL TO CHANNEL ISOLATION IS DESIRED THEN SEPARATE LOOP SUPPLIES MUST BE USED FOR EACH CHANNEL.

0 TO 5 VDC OUTPUT MODULE

DA4
DA4T

DESCRIPTION

The DA4 and DA4T modules provides a single channel of optically isolated digital-to-analog conversion. The module plugs into any Opto 22 analog I/O mounting rack and is secured by a captive screw. Field connections to the module are made via the terminal strip located on the analog I/O mounting rack. The DA4 module output is single-ended, its negative (-) output terminal is connected to the analog common. The DA4T module provides tranformer isolation between the field terminals and the analog supply, it should be used when the 0 to 5 volt source is required to be "floating" and cannot be connected to the analog I/O mounting rack common.

SPECIFICATIONS

	DA4	DA4T
Input Data:	12 Bit Serial Data	12 Bit Serial Data
Isolation (Output-To-Input):	4000 V_{rms}	4000 V_{rms}
Signal Output:	0 To 5 VDC	0 To 5 VDC
Span:	5 VDC	5 VDC
One Bit Change:	1.22 mV	1.22 mV
Input Response Time: (% Of Span/Δ Volts/Δ Time)	99.9%/4.995 V/3 ms	99.9%/4.995 V/3 ms
Common Mode Output Range:	N/A	± 500 volts
Common Mode Resistance: (either output terminal to analog common)	N/A	15 GigaOhms
Output Current (Source Or Sink):	± 70 mA	± 25 mA
Short Circuit Current, Continous:	125 mA, typical	125 mA, typical
Accuracy:	± 0.1% Of Span	± 0.1% Of Span
Gain Tempco.	± 50 PPM/ ^{o} C	± 80 PPM/ ^{o} C
Offset Tempco.	± 20 PPM/ ^{o} C	± 20 PPM/ ^{o} C
Power Requirements:		
Output Side*	15 V @ 20 mA	30 V @ 20 mA (No Load)***
	-15 V @ 10 mA	30 V @ 35 mA (Full Load)***
Reference**	-5.000 V (± 2 mV)	Internal
Logic	5 V @ 24 mA	5 V @ 24 mA
Ambient Temperature:		
Operating	0 To 70^{o} C	0 To 70^{o} C
Storage	-25 To 85^{o} C	-25 To 85^{o} C

* For the module only, does not include the load current.
** The reference voltage is derived from the ± 15 VDC and is provided by the Opto 22 analog I/O mounting rack.
*** The 30 volts is derived from the ± 15 VDC power supply connected to the Opto 22 analog I/O mounting rack.

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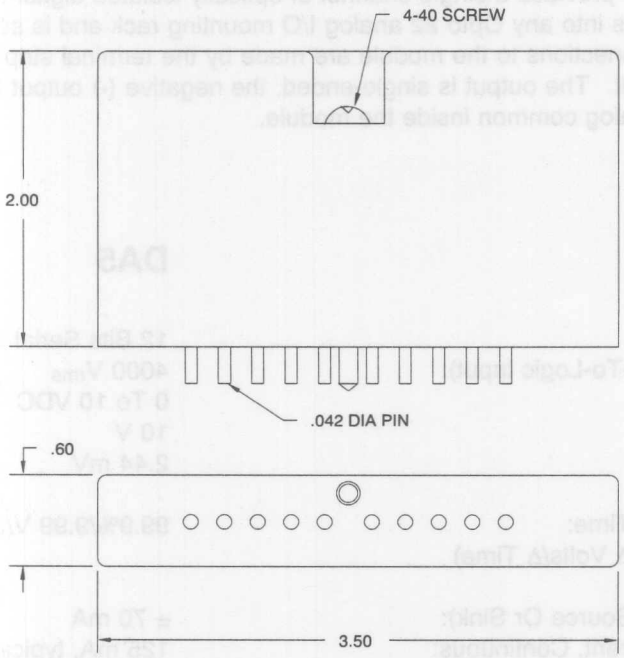
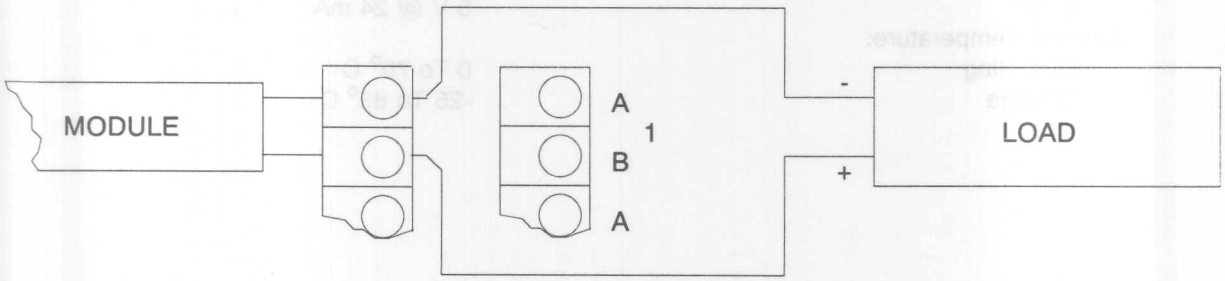
DIMENSIONS



SAMPLE WIRING DIAGRAM



Note: The DA4 module output is single-ended, its negative (-) output terminal is connected to the analog common. The DA4T module provides tranformer isolation between the field terminals and the analog supply, it should be used when the 0 to 5 volt source is required to be "floating" and cannot be connected to the analog I/O mounting rack common.

0 TO 10 VDC OUTPUT MODULE DA5

DESCRIPTION

The DA5 module provides a single channel of optically isolated digital-to-analog conversion. The module plugs into any Opto 22 analog I/O mounting rack and is secured by a captive screw. Field connections to the module are made by the terminal strip located on the analog I/O mounting rack. The output is single-ended, the negative (-) output terminal of the module is connected to analog common inside the module.

SPECIFICATIONS

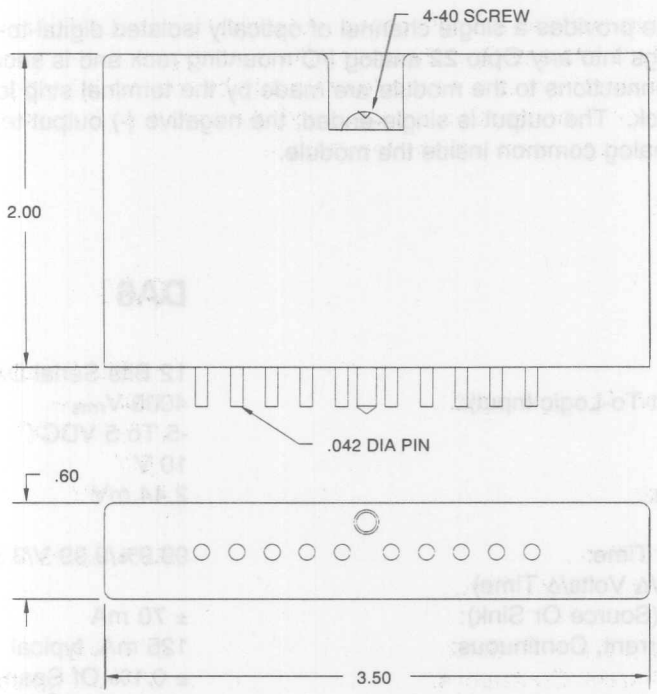
	DA5
Input Data:	12 Bits Serial Data
Isolation (Output-To-Logic Input):	4000 V_{rms}
Output Range:	0 To 10 VDC
Span:	10 V
One Bit Change:	2.44 mV
Input Response Time: (% Of Span/Δ Volts/Δ Time)	99.9%/9.99 V/3 ms
Output Current (Source Or Sink):	± 70 mA
Short Circuit Current, Continuous:	125 mA, typical
Accuracy:	± 0.1% Of Span
Gain Tempco.	± 50 PPM/ ^{o} C
Offset Tempco.	± 20 PPM/ ^{o} C
Power Requirements:	
Output Side*	15 V @ 20 mA -15 V @ 10 mA
Reference**	-5.000 V (± 2 mV)
Logic	5 V @ 24 mA
Ambient Temperature:	
Operating	0 To 70^{o} C
Storage	-25 To 85^{o} C

* For the module only, does not include the load current.

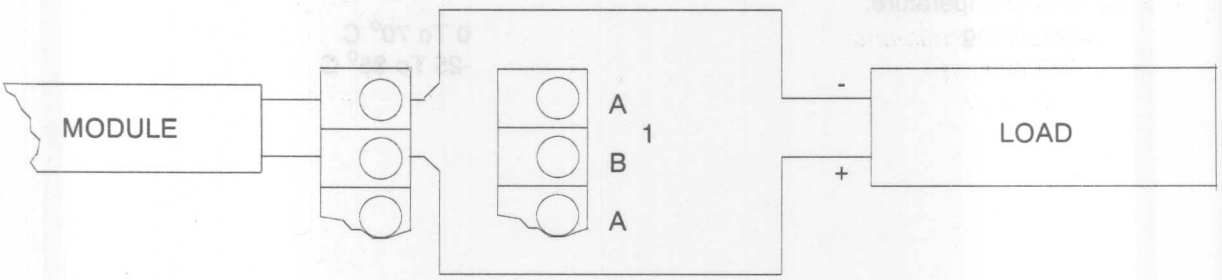
** The reference voltage is derived from the ± 15 VDC and is provided by the Opto 22 analog I/O mounting rack.

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

DIMENSIONS



SAMPLE WIRING DIAGRAM



-5 TO 5 VDC OUTPUT MODULE DA6

DESCRIPTION

The DA6 module provides a single channel of optically isolated digital-to-analog conversion. The module plugs into any Opto 22 analog I/O mounting rack and is secured by a captive screw. Field connections to the module are made by the terminal strip located on the analog I/O mounting rack. The output is single-ended, the negative (-) output terminal of the module is connected to analog common inside the module.

SPECIFICATIONS

	DA6
Input Data:	12 Bits Serial Data
Isolation (Output-To-Logic Input):	4000 V_{rms}
Output Range:	-5 To 5 VDC
Span:	10 V
One Bit Change:	2.44 mV
Input Response Time: (% Of Span/Δ Volts/Δ Time)	99.9%/9.99 V/3 ms
Output Current (Source Or Sink):	± 70 mA
Short Circuit Current, Continuous:	125 mA, typical
Accuracy:	± 0.1% Of Span
Gain Tempco.	± 50 PPM/ ^{o} C
Offset Tempco.	± 20 PPM/ ^{o} C
Power Requirements:	
Output Side*	15 V @ 20 mA -15 V @ 10 mA
Reference**	-5.000 V (± 2 mV)
Logic	5 V @ 24 mA
Ambient Temperature:	
Operating	0 To 70^{o} C
Storage	-25 To 85^{o} C

* For the module only, does not include the load current.

** The reference voltage is derived from the ± 15 VDC and is provided by the Opto 22 analog I/O mounting rack.

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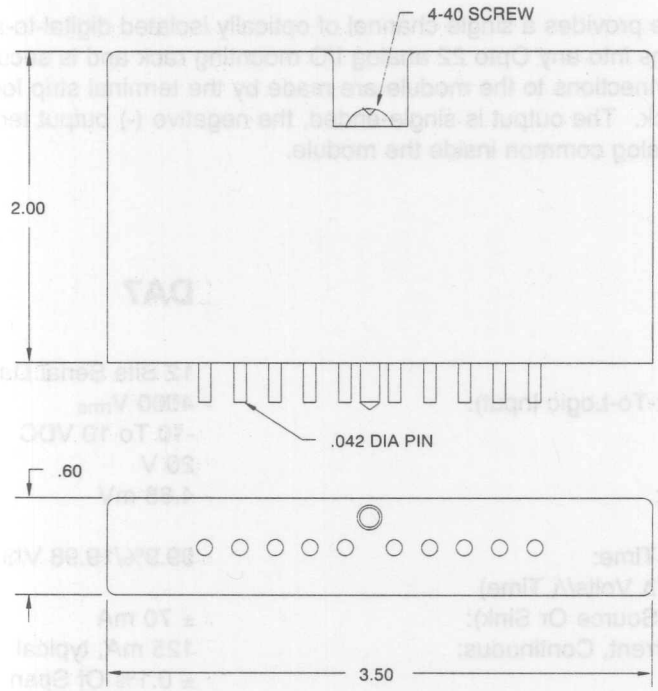
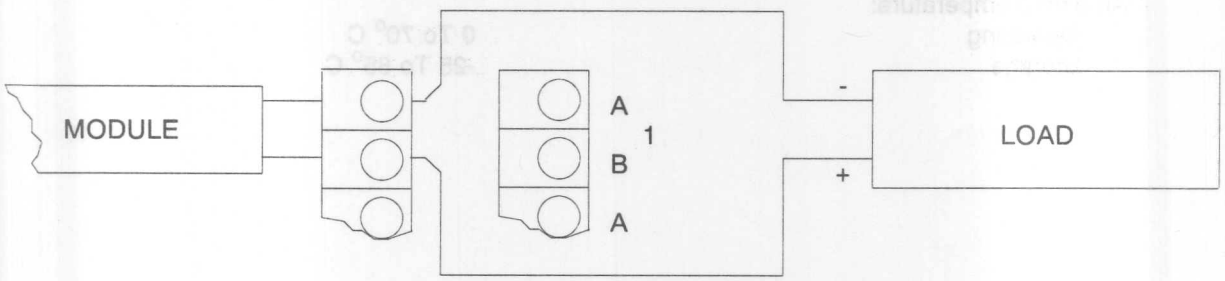
15461 Springdale St., Huntington Beach, CA 92649-1368

DIMENSIONS



SAMPLE WIRING DIAGRAM



-10 TO 10 VDC OUTPUT MODULE DA7

DESCRIPTION

The DA7 module provides a single channel of optically isolated digital-to-analog conversion. The module plugs into any Opto 22 analog I/O mounting rack and is secured by a captive screw. Field connections to the module are made by the terminal strip located on the analog I/O mounting rack. The output is single-ended, the negative (-) output terminal of the module is connected to analog common inside the module.

SPECIFICATIONS

	DA7
Input Data:	12 Bits Serial Data
Isolation (Output-To-Logic Input):	4000 V_{rms}
Output Range:	-10 To 10 VDC
Span:	20 V
One Bit Change:	4.88 mV
Input Response Time: (% Of Span/Δ Volts/Δ Time)	99.9%/19.98 V/3 ms
Output Current (Source Or Sink):	± 70 mA
Short Circuit Current, Continuous:	125 mA, typical
Accuracy:	± 0.1% Of Span
Gain Tempco.	± 50 PPM/ ^{o} C
Offset Tempco.	± 20 PPM/ ^{o} C
Power Requirements:	
Output Side*	15 V @ 20 mA -15 V @ 10 mA
Reference**	-5.000 V (± 2 mV)
Logic	5 V @ 24 mA
Ambient Temperature:	
Operating	0 To 70^{o} C
Storage	-25 To 85^{o} C

* For the module only, does not include the load current.

** The reference voltage is derived from the ± 15 VDC and is provided by the Opto 22 analog I/O mounting rack

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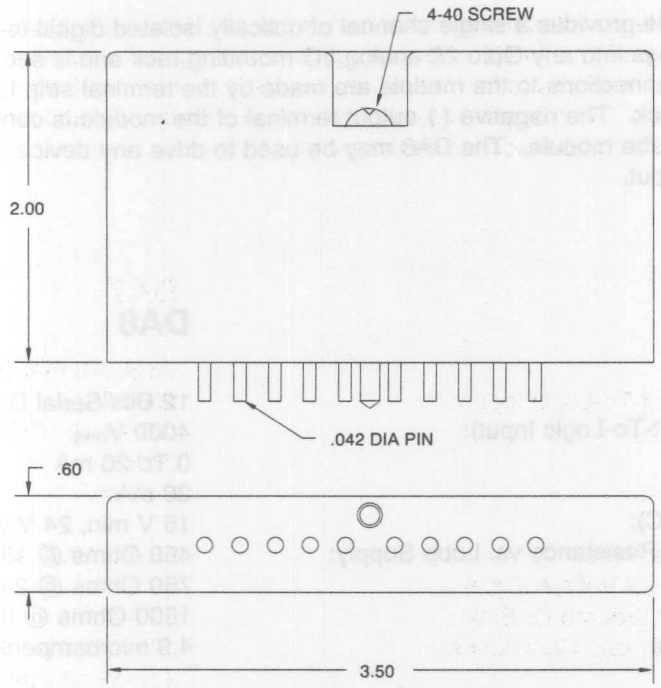
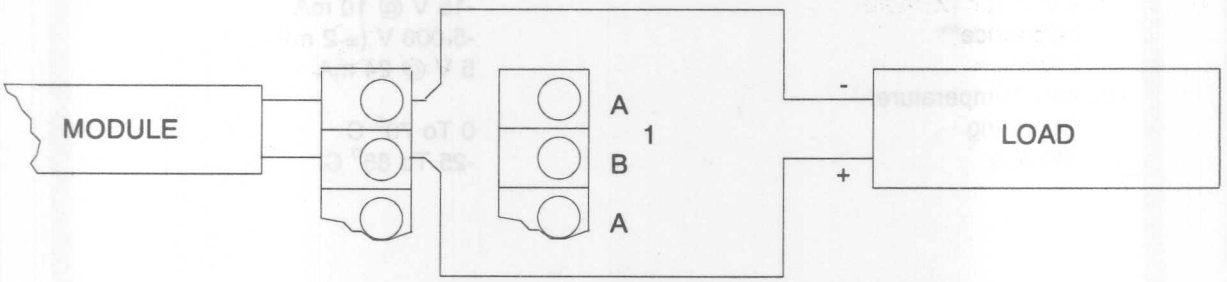
DIMENSIONS



SAMPLE WIRING DIAGRAM



0 TO 20 mA CURRENT OUTPUT MODULE DA8

DESCRIPTION

The DA8 module provides a single channel of optically isolated digital-to-analog conversion. The module plugs into any Opto 22 analog I/O mounting rack and is secured by a captive screw. Field connections to the module are made by the terminal strip located on the analog I/O mounting rack. The negative (-) output terminal of the module is connected to analog common inside the module. The DA8 may be used to drive any device that uses 0 to 20 mA as its control input.

SPECIFICATIONS

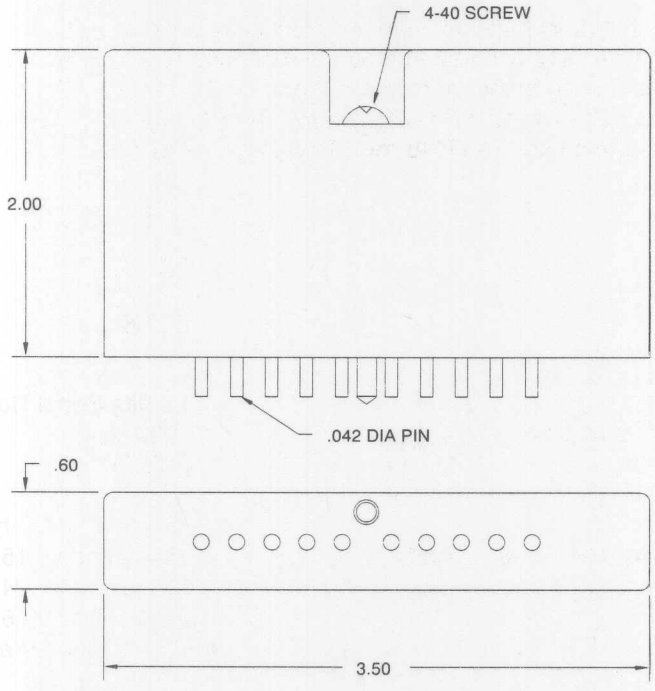
	DA8
Input Data:	12 Bits Serial Data
Isolation (Output-To-Logic Input):	4000 V_{rms}
Signal Output:	0 To 20 mA
Span:	20 mA
Loop Supply (DC):	15 V min, 24 V typical, 60 V maximum
Maximum Load Resistance vs. Loop Supply:	450 Ohms @ 15 V 750 Ohms @ 24 V 1500 Ohms @ 60 V
One Bit Change:	4.9 microamperes
Input Response Time: (% Of Span/Δ Volts/Δ Time)	99.9%/19.98 V/3 ms
Accuracy:	± 0.1% Of Span
Gain Tempco.	± 50 PPM/ ^{o} C
Offset Tempco.	± 20 PPM/ ^{o} C
Power Requirements:	
Output Side	15 V @ 20 mA -15 V @ 10 mA
Reference**	-5.000 V (± 2 mV)
Logic	5 V @ 24 mA
Ambient Temperature:	
Operating	0 To 70^{o} C
Storage	-25 To 85^{o} C

* For the module only, does not include the 0 - 20 mA loop current.

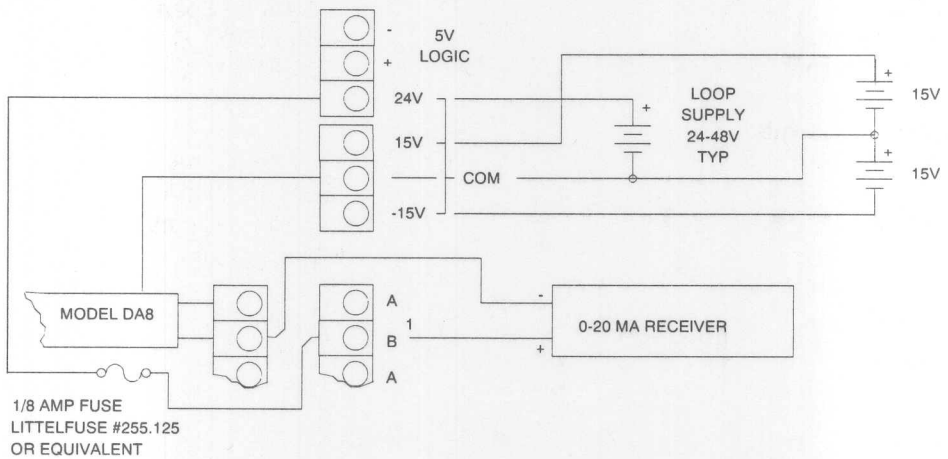
** The reference is derived from the ± 15 VDC and is provided by the Opto 22 analog I/O mounting rack.

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

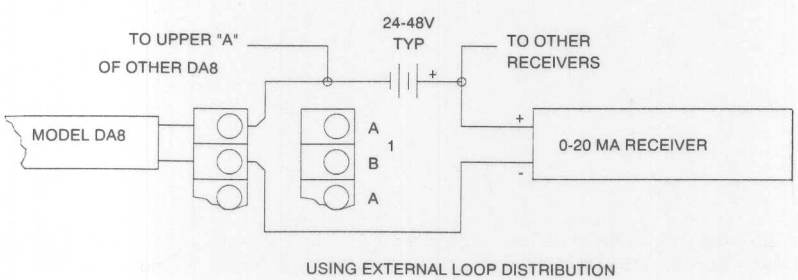
DIMENSIONS



SAMPLE WIRING DIAGRAM



USING LOOP SOURCE DISTRIBUTION



USING EXTERNAL LOOP DISTRIBUTION

Notes:

SECTION 8

ACCESSORIES

DESCRIPTION	PAGE
Fuses	8 - 1
Cables	8 - 2
Power Supplies	8 - 3
Jumper Straps	8 - 6
Auto/Manual On/Off Switch Assembly	8 - 7
LC Communicator	8 - 8
OPTOWARE Software Driver	8 - 10
Third-Party Software Packages	8 - 11
Cyrano Software Package	8 - 12

FUSES

FUSE01
FUSE02
FUSE04
FUSE05
FUSE.125

DESCRIPTION

Each digital I/O mounting rack has plug-in fuse positions for the power I/O modules with 5 Amp fuses installed at the factory. Some I/O mounting racks have 1 Amp fuses installed in plug-in positions in the V_{cc} distribution line.

ORDERING GUIDE

Description	Part Number
1 amp fuse for digital logic power (Old P/N: 232) (Littelfuse, 312-824-1188, P/N 275-001; Bel, 201-432-0463, P/N MF1)	FUSE01
2 amp fuse for analog logic power (Littelfuse, P/N 275-002; Bel, P/N MF2)	FUSE02
4 amp fuse for digital I/O modules used with the PB8HE and PB16HE for European applications (Littelfuse, P/N 275-004; Power Dynamics, Inc., 201-736-5722, Series TRS-F #91370K-4A)	FUSE04
5 amp fuse for digital I/O modules (Old P/N: 190) (Littelfuse, P/N 275-005; Bel, P/N MF5)	FUSE05
0.125 amp fuse for analog loop source power applications (Littelfuse, P/N 275-125; Bel, P/N MF 125)	FUSE.125

CABLES AND CONNECTORS

DESCRIPTION

Opto 22 supplies several standard cables which interface with various host controllers. There are three series of cables available in various standard lengths. Each series of cables is designated according to the type of connector on each end. The HH series has a header connector on both ends. The CA series has an edge connector on both ends. The OD series has a header connector on one end and an edge connector on the other end. The three cable types use 50-conductor, ribbon cable and may be ordered in pre-defined lengths.

ORDERING GUIDE

Length (feet)	Series Part Numbers HH	CA	OD
1.5	HH1.5	—	—
2	—	CA2	OD2
4	HH4	CA4	OD4
6	HH6	CA6	OD6
8	HH8	CA8	OD8
10	HH10	CA10	OD10

BUILDING YOUR OWN CABLES

If the standard cables do not meet your requirements, the following list can help in choosing the appropriate connectors and cable.

Cable:

3M (800-328-7732)	P/N 3365/50
ALPHA (201-925-8000)	P/N 3580/50 or 3583/50

Connectors for HH Series:

3M	P/N 3425-7000
Circuit Assemblies Inc. (714-855-7887)	P/N CA-50IDSB
Panduit (312-532-1800)	P/N 050-050-455

Connectors for CA Series:

3M	P/N 3415-0001

Connectors for OD Series:

End #1 (Edge Connector) - 3M	P/N 3415-0001
End #1 (Edge Connector) - Panduit	P/N 055-050-455
End #2 (Header Connector) - 3M	P/N 3425-7050

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

POWER SUPPLIES

PBSA (120 VAC)
PBSB (220 VAC)
PBSC (12/24 VDC)

DESCRIPTION

Opto 22 offers a 5 VDC power supply which mounts directly to digital I/O racks having a header connector (PB4H, PB8H, PB8HE, PB16H, PB16HE, PB16HC, and PB16HQ). The power supply connects with two screws to threaded contacts on the rack. The power supply mounting allows an digital OPTOMUX Brain Board to be mounted above the power supply. The power supply provides sufficient current to power 16 digital channels of I/O and one digital OPTOMUX Brain Board.

The power supply is only for use with modules that use a 5V logic voltage (ODC5, OAC5, IDC5, IAC5, etc.)

Three versions of the power supply are available: the PBSA for 120 VAC, the PBSB for 220 VAC, and the PBSC for 12 or 24 VDC. The PBSA and PBSB power supplies do not provide enough current to power a PAMUX Brain Board and, therefore, cannot be used on a PAMUX/mounting rack assembly. However, the PBSC can be used to power a PAMUX/mounting rack assembly.

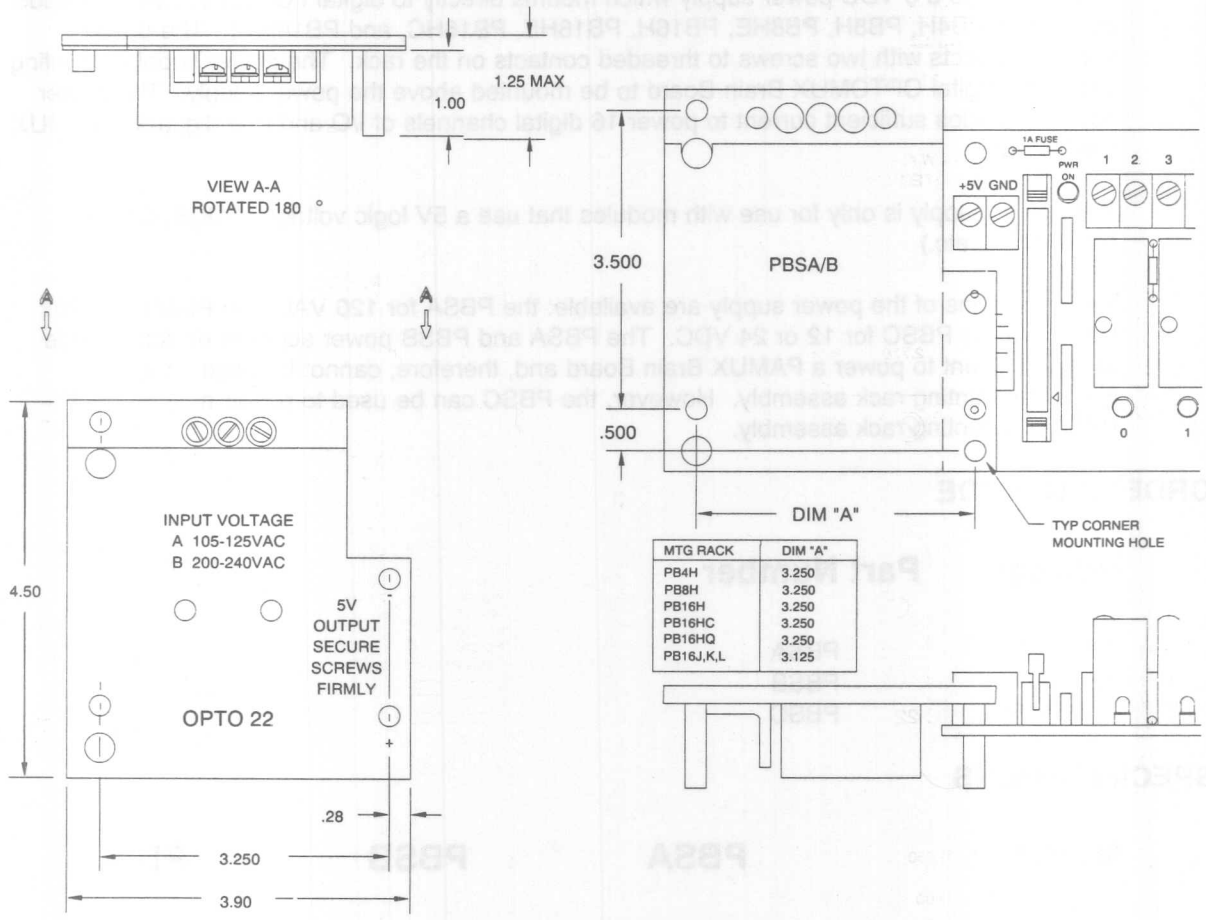
ORDERING GUIDE

Voltage	Part Number
120 VAC	PBSA
220 VAC	PBSB
12/24 VDC	PBSC

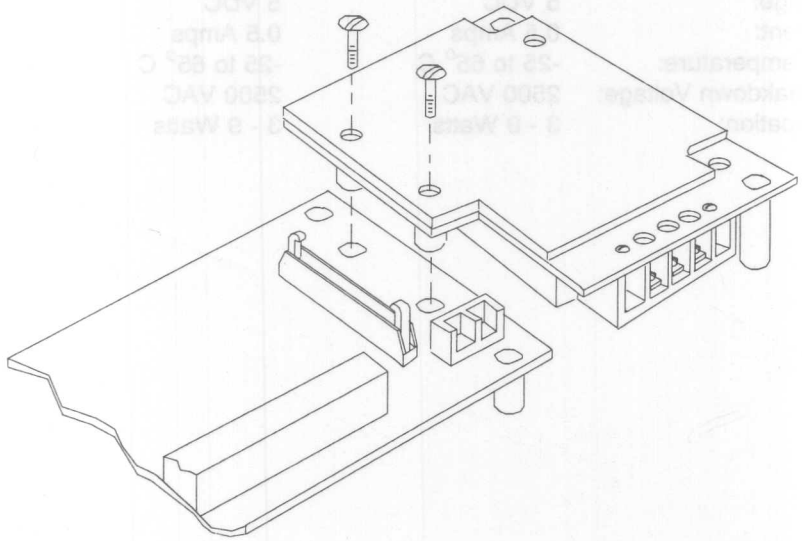
SPECIFICATIONS

Model	PBSA	PBSB	PBSC
Input Range:	105 - 125 VAC	200 - 240 VAC	10 - 28 VDC
Output Voltage:	5 VDC	5 VDC	5 VDC
Output Current:	0.5 Amps	0.5 Amps	1.5 Amps
Operating Temperature:	-25 to 65° C	-25 to 65° C	-25 to 65° C
Isolation Breakdown Voltage:	2500 VAC	2500 VAC	500 VAC
Power Dissipation:	3 - 9 Watts	3 - 9 Watts	3 - 10 Watts

DIMENSIONS (PBSA & PBSB)



MTG RACK	DIM "A"
PB4H	3.250
PB8H	3.250
PB16H	3.250
PB16HC	3.250
PB16HQ	3.250
PB16J,K,L	3.125



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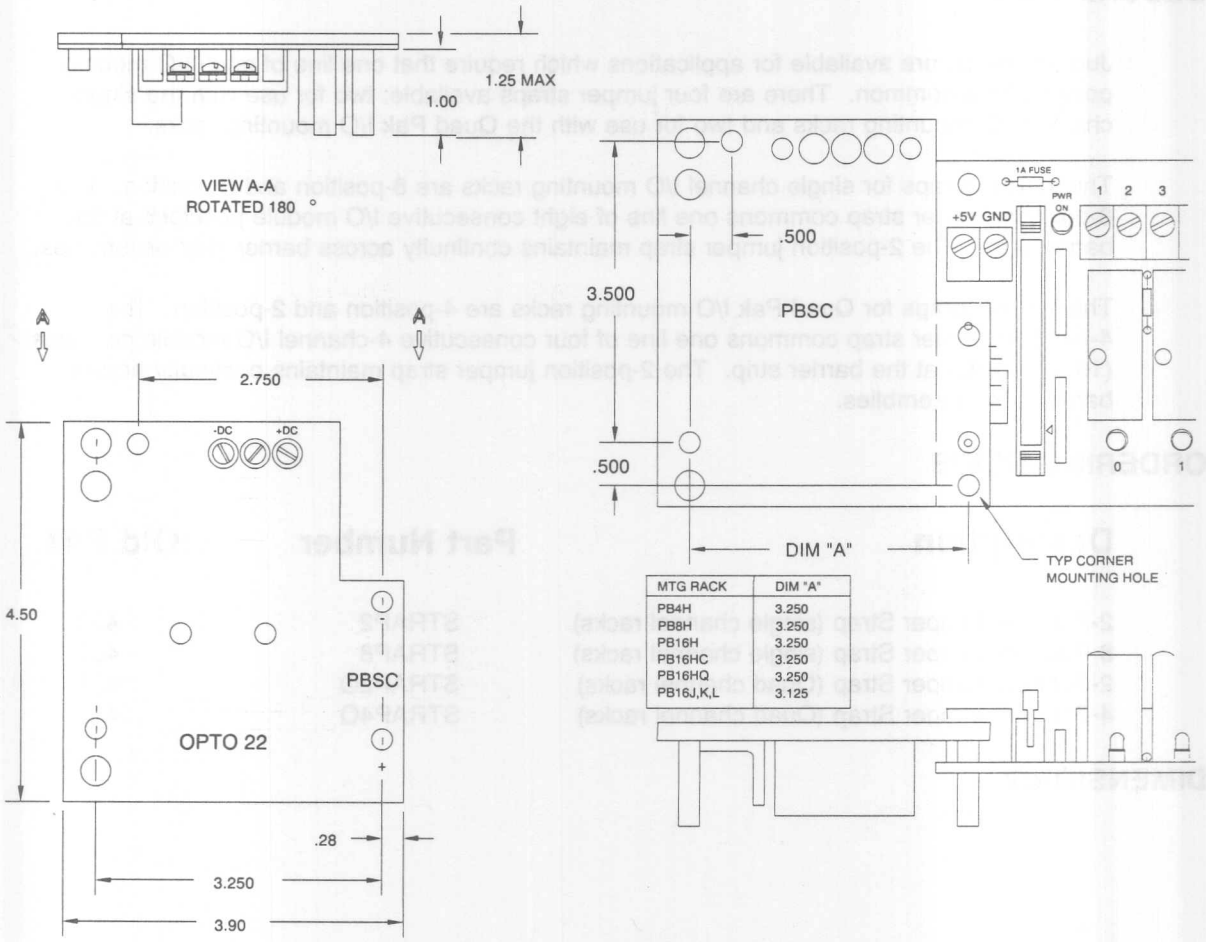
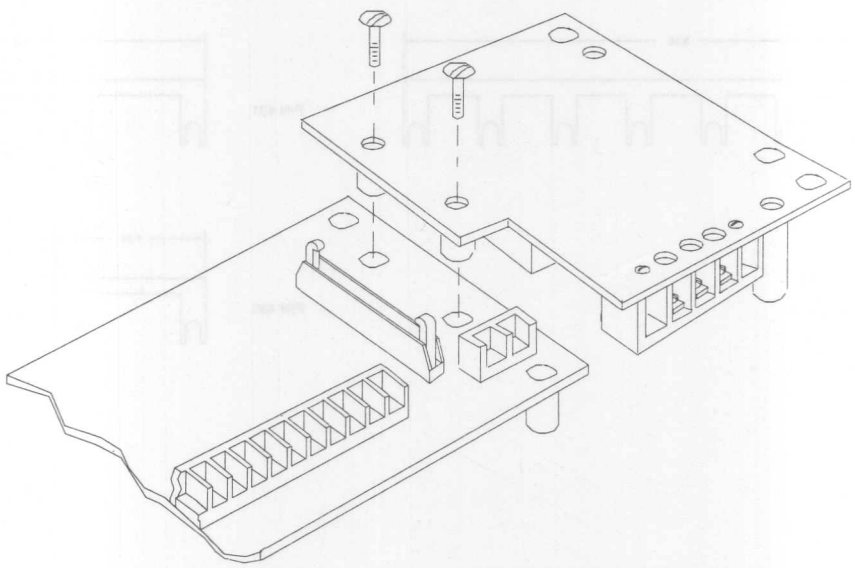
DIMENSIONS (PBSC)



MTG RACK	DIM "A"
PB4H	3.250
PB8H	3.250
PB16H	3.250
PB16HC	3.250
PB16HQ	3.250
PB16J,K,L	3.125



JUMPER STRAPS

STRAP2
STRAP8
STRAP2Q
STRAP4Q

DESCRIPTION

Jumper straps are available for applications which require that one line of each I/O module position be a common. There are four jumper straps available: two for use with the single channel I/O mounting racks and two for use with the Quad Pak I/O mounting racks.

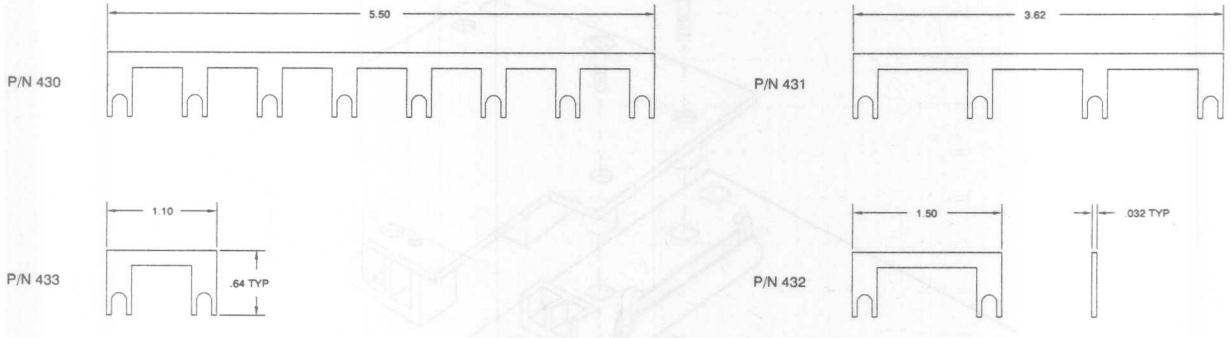
The jumper straps for single channel I/O mounting racks are 8-position and 2-position. The 8-position jumper strap commons one line of eight consecutive I/O module positions at the barrier strip. The 2-position jumper strap maintains continuity across barrier strip assemblies.

The jumper straps for Quad Pak I/O mounting racks are 4-position and 2-position. The 4-position jumper strap commons one line of four consecutive 4-channel I/O module positions (16 I/O points) at the barrier strip. The 2-position jumper strap maintains continuity across barrier strip assemblies.

ORDERING GUIDE

Description	Part Number	Old P/N
2-Position Jumper Strap (single channel racks)	STRAP2	433
8-Position Jumper Strap (single channel racks)	STRAP8	430
2-Position Jumper Strap (Quad channel racks)	STRAP2Q	432
4-Position Jumper Strap (Quad channel racks)	STRAP4Q	431

DIMENSIONS



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15461 Springdale St., Huntington Beach, CA 92649-1368

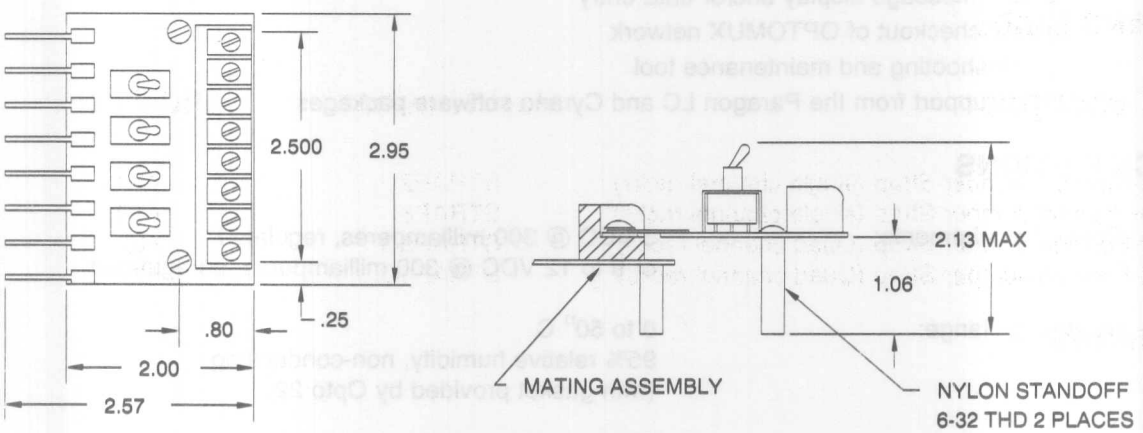
DESCRIPTION

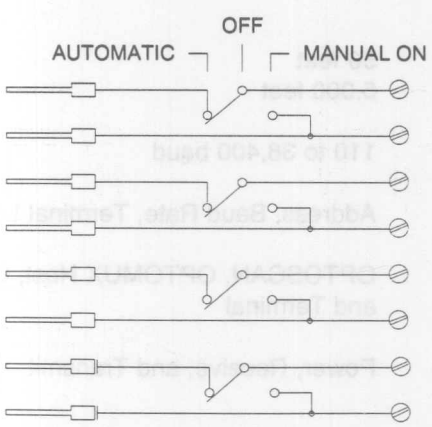
The PB4MOA is a four channel switch assembly which connects directly to the barrier strip of any Opto 22 I/O mounting rack. Each three-position toggle switch can be set to:

Manual	-	Connects two adjacent terminals
Off	-	Opens one field line
Auto	-	Connects field line to mounting rack barrier strip terminal

The PB4MOA switch assembly is used for adding manual control to output channels.

DIMENSIONS & SCHEMATIC





LC Communicator For The OPTOMUX Network LC COMMUNICATOR

DESCRIPTION

The Opto 22 LC Communicator is an ASCII-based operator terminal with a 20 key numeric keypad and a two line, 16 character/line alphanumeric back-lited LCD display.

The LC Communicator communicates on an RS-232 or RS-422/485 network as an addressable device. The communications protocol is similar to the OPTOMUX protocol and can thereby reside on an OPTOMUX network. Address, baud rate, and setup parameters are programmable from the keyboard. The LC Communicator uses non-volatile memory for storing the setup parameters.

The LC Communicator has four different modes of operation: OPTOSCAN, OPTOMUX Host, OPTOMUX Slave, and Terminal. The different modes of operation allow the LC Communicator to function as a multi-purpose handheld terminal for industrial applications.

The LC Communicator, with its different modes of operation, allows the user to apply it in many different applications.

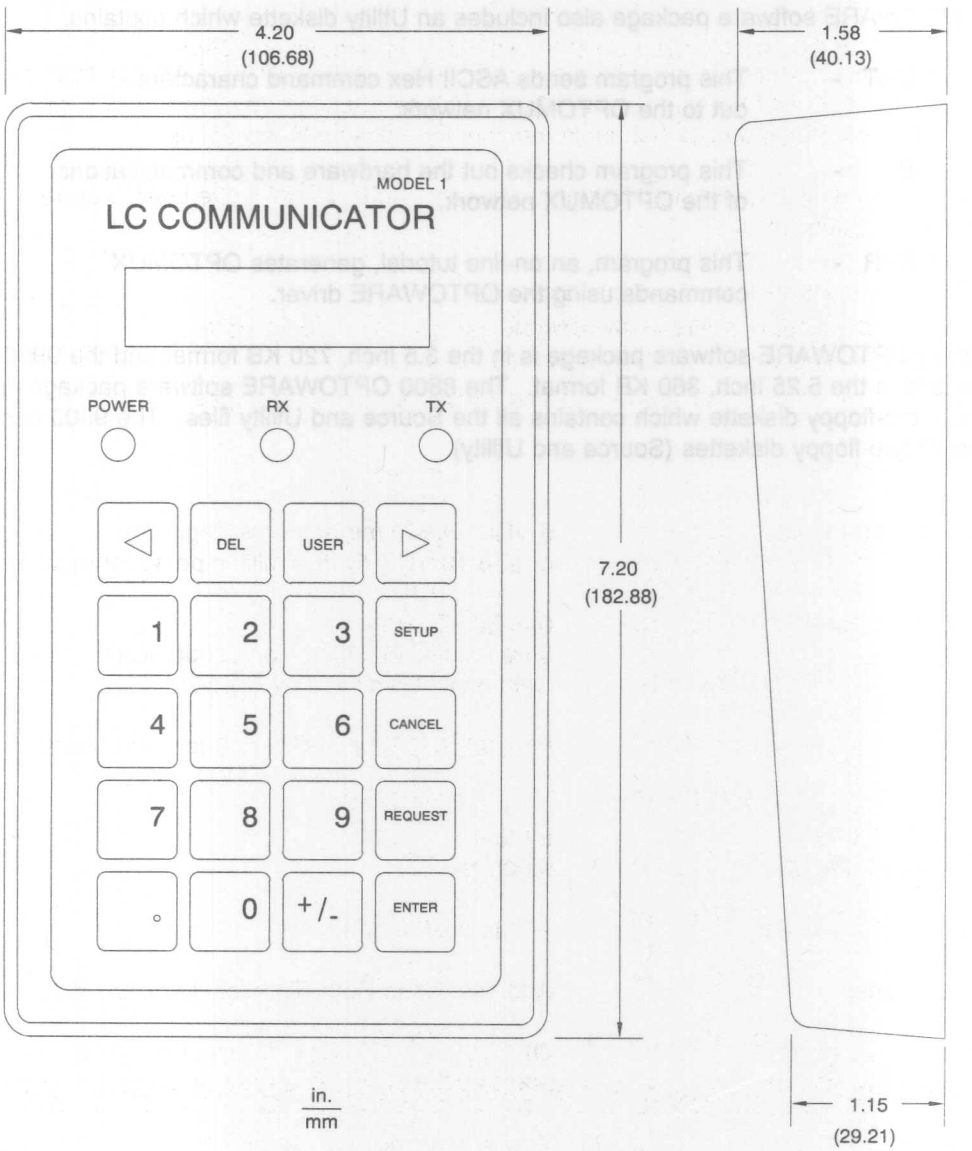
- Remote message display and/or data entry
- System checkout of OPTOMUX network
- Troubleshooting and maintenance tool
- Direct support from the Paragon LC and Cyrano software packages

SPECIFICATIONS

Power Requirements:	5 VDC @ 300 milliamperes, regulated or 9 to 12 VDC @ 300 milliamperes, unregulated
Operating Range:	0 to 50° C 95% relative humidity, non-condensing (with gasket provided by Opto 22)
Interface:	RS-232 or RS-422/485 (DB 9 female connector)
Range:	
RS-232	50 feet
RS-422/485	5,000 feet
Communication Rates:	110 to 38,400 baud
Setup Options:	Address, Baud Rate, Terminal Lockout, Mode, and Password
Modes Of Operation:	OPTOSCAN, OPTOMUX Host, OPTOMUX Slave, and Terminal
Indicators:	Power, Receive, and Transmit

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

DIMENSIONS


4.20
(106.68)
1.58
(40.13)
MODEL 1
LC COMMUNICATOR
POWER
RX
TX
DEL
USER
SETUP
CANCEL
REQUEST
ENTER
7.20
(182.88)
1.15
(29.21)
in.
mm

DESCRIPTION

OPTOWARE is a software package which includes an assembly language subroutine for interfacing between OPTOMUX and application programs written in high level languages. The OPTOWARE driver subroutine can be called from BASIC, Turbo Pascal, C, or assembly. Complete, commented assembly language source code is included for tailoring the OPTOWARE driver to interface with other high level language not directly supported.

The OPTOWARE software package also includes an Utility diskette which contains:

HOST - This program sends ASCII Hex command characters out to the OPTOMUX network.

OS - This program checks out the hardware and communications of the OPTOMUX network.

USER - This program, an on-line tutorial, generates OPTOMUX commands using the OPTOWARE driver.

The 8800 OPTOWARE software package is in the 3.5 inch, 720 KB format and the 9900 package is in the 5.25 inch, 360 KB format. The 8800 OPTOWARE software package consist of one micro-floppy diskette which contains all the Source and Utility files. The 9900 package consist of two floppy diskettes (Source and Utility).

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

IBM/OPTOMUX SOFTWARE
THIRD-PARTY VENDOR SUPPORT

DESCRIPTION

The following vendors offer software packages which execute on IBM PC/XT/AT, PS/2, or compatibles and support the Opto 22 family of I/O products.

HEURISTICS, INC. 9837 Folsom Blvd. Suite J231 Sacramento, CA 95827	(916) 369-6606 Contact: Steve Schaeffer Process Control: "Onspec"
INTEC CONTROLS CORP. 130 West St. Walpole, MA 02081	(508) 660-1221 Contact: Tom Kraus Process Control: "PARAGON Control" **
INTELLUTION, INC. 315 Norwood Park South Norwood, MA 02062	(508) 769-8878 Contact: Mark Walters Process Control: "The Fix" *
LABORATORY TECHNOLOGIES CORP. 400 Research Drive Wilmington, MA 01887	(508) 657-5400 Contact: Beth Shugan Data Acquisition: Labtech Notebook
SYSTEMS ASSOCIATES, INC. 500 Lehman Avenue Bowling Green, OH 43402	(419) 354-3909 Contact: David Codding Energy Management: "Energy 2.0" *
TRANSDUCTION LTD. 1645 Sismet Road, #11 Mississauga, Ont. Canada L4W 1Z3	(800) 268-0427 Contact: Frank Ollie Machine Control: RTES
UNIVERSAL AUTOMATION, INC. #9 G Rebel Road Hudson, NH 03051	(603) 880-6553 Contact: Ron Lavallee Flowchart Control: "FloPro"
WIZDOM SYSTEMS, INC. 1260 Iroquois Avenue Naperville, Il 60540	(312) 505-9226 Contact: Bruce Buscher Ladder Logic: "86-LADDER-PC"

* IBM Certified

** The PARAGON Control software package, with CAD like interface, requires no programming.

DESCRIPTION

Cyrano™, a new visual control language, greatly simplifies program development at the host computer and provides high speed control with Opto 22's LC4/PAMUX systems. The Cyrano software package, with its CAD-like environment, is as easy to program as drawing a flowchart of your control strategy. High performance multi-tasking code that is ready to run on an Opto 22 LC4 Local Controller is automatically generated from your flowchart. Integrated debugger allows you to single-step, set breakpoints, and view data while visually following execution of your flowchart. Networking is easily achieved by linking LC4's to a host computer with two twisted pair.

FEATURES

- Simple visual programming allows the you to solve your problem by creating a flowchart displaying your solution.
- Powerful integrated debugger.
- Open architecture system.
- Code generated by Cyrano is ASCII text; it can be modified with an editor to provide special features not available in Cyrano (e.g., read data from a bar code scanner, etc.).
- Multi-tasking allows the user to solve logical parts of his overall problem as individual tasks.
- Advance functions like floating point arithmetic, COS, SIN, etc.
- Single-step, use breakpoints, and view data while following execution through flowchart on IBM PC.
- Non-proprietary, simple ASCII protocol to send and receive data from LC4's running Cyrano applications.
- All I/O points and variables are given meaningful names up to 31 characters.
- All text appearing in the programming environment is contained in ASCII files, this allows any function descriptions to be renamed (e.g., TURN ON to ACTIVATE, etc.) or translated to a different language.
- Stand alone as well as networked solutions.
- Networkable (RS-422/485 two twisted pair) up to 100 Opto 22 LC4 Local Controllers can be connected to a host computer on a single communication link.

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

The Cyrano™ software requires the following host computer hardware:

- IBM AT, PS/2, or compatibles
- 640K RAM
- Hard disk
- EGA graphics adapter card
- Serial port (RS-232 or RS-422/485)
- Mouse
- Opto 22 LC4 Local Controller with EX1 daughter card
- Cyrano EPROM for LC4 Local Controller
- PAMUX Analog and Digital I/O boards (B4, B5, and B6 Brain Boards)
- LC Communicator handheld terminal (optional)

ORDERING GUIDE

Descriptions	Part Number
Cyrano Software Package for the IBM AT, PS/2, or compatibles.	CYRANO
Cyrano EPROM for LC4 Local Controller.	CYRANO LC4 EPROM

Notes:

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

Index

AC24 . . . . . 2 - 7
AC24AT . . . . . 2 - 7
AC28 . . . . . 2 - 9
AC30A . . . . . 2 - 10
AC30B . . . . . 2 - 10
AC31 . . . . . 2 - 12
AC32 . . . . . 2 - 14
AC33 . . . . . 2 - 15
AC34 . . . . . 2 - 16
AC36 . . . . . 2 - 17
AC422 . . . . . 2 - 18
AC422AT . . . . . 2 - 18
AC5 . . . . . 2 - 1
AC6 . . . . . 2 - 2
AC7A . . . . . 2 - 3
AC7B . . . . . 2 - 3
AC8 . . . . . 2 - 5
AC8A . . . . . 2 - 5
AC8B . . . . . 2 - 5
AD10T2 . . . . . 7 - 20
AD11 . . . . . 7 - 24
AD12 . . . . . 7 - 26
AD13T . . . . . 7 - 28
AD14T . . . . . 7 - 30
AD15T . . . . . 7 - 32
AD16T . . . . . 7 - 34
AD17T . . . . . 7 - 36
AD18T . . . . . 7 - 41
AD19T . . . . . 7 - 44
AD20 . . . . . 7 - 47
AD3 . . . . . 7 - 1
AD3T . . . . . 7 - 1
AD4 . . . . . 7 - 3
AD5 . . . . . 7 - 6
AD5T . . . . . 7 - 6
AD6 . . . . . 7 - 10
AD6HS . . . . . 7 - 10
AD6T . . . . . 7 - 10
AD7 . . . . . 7 - 12
AD8 . . . . . 7 - 14
AD8T . . . . . 7 - 14
AD9T . . . . . 7 - 18
B1 . . . . . 1 - 1
B2 . . . . . 1 - 3
B4 . . . . . 1 - 5
B5 . . . . . 1 - 7
B6 . . . . . 1 - 9
CA10 . . . . . 8 - 2
CA2 . . . . . 8 - 2
CA4 . . . . . 8 - 2
CA6 . . . . . 8 - 2
CA8 . . . . . 8 - 2
CYRANO . . . . . 8 - 12
CYRANO LC4 EPROM . . . 8 - 12
DA3 . . . . . 7 - 49
DA3T . . . . . 7 - 49

DA4 . . . . . 7 - 51
DA4T . . . . . 7 - 51
DA5 . . . . . 7 - 53
DA6 . . . . . 7 - 55
DA7 . . . . . 7 - 56
DA8 . . . . . 7 - 58
EX1 . . . . . 3 - 7
EX2 . . . . . 3 - 8
FUSE01 . . . . . 8 - 1
FUSE02 . . . . . 8 - 1
FUSE04 . . . . . 8 - 1
FUSE05 . . . . . 8 - 1
FUSE.125 . . . . . 8 - 1
HH10 . . . . . 8 - 2
HH1.5 . . . . . 8 - 2
HH4 . . . . . 8 - 2
HH6 . . . . . 8 - 2
HH8 . . . . . 8 - 2
IAC15 . . . . . 6 - 4, 6 - 12
IAC15A . . . . . 6 - 4, 6 - 12
IAC24 . . . . . 6 - 4, 6 - 12
IAC5 . . . . . 6 - 4, 6 - 12
IAC5A . . . . . 6 - 4, 6 - 12
IAC5AQ . . . . . 6 - 27, 6 - 35
IAC5P . . . . . 6 - 44, 6 - 50
IAC5Q . . . . . 6 - 27
IDC15 . . . . . 6 - 4, 6 - 12
IDC24 . . . . . 6 - 4, 6 - 12
IDC5 . . . . . 6 - 4, 6 - 12
IDC5B . . . . . 6 - 12
IDC5BQ . . . . . 6 - 35
IDC5D . . . . . 6 - 12
IDC5G . . . . . 6 - 4, 6 - 12
IDC5P . . . . . 6 - 44, 6 - 50
IDC5Q . . . . . 6 - 27, 6 - 35
IEEE488 . . . . . 2 - 19
INPUT SWITCH . . . . . 6 - 24
LC COMMUNICATOR . . . . 8 - 8
LC2 . . . . . 3 - 1
LC2A . . . . . 3 - 1
LC2DC . . . . . 3 - 1
LC4A . . . . . 3 - 4
LC4B . . . . . 3 - 4
LC4DC . . . . . 3 - 4
OAC15 . . . . . 6 - 8
OAC15A . . . . . 6 - 8
OAC24 . . . . . 6 - 8
OAC24A . . . . . 6 - 8
OAC5 . . . . . 6 - 8
OAC5A . . . . . 6 - 8
OAC5A5 . . . . . 6 - 8
OAC5P . . . . . 6 - 47
OAC5Q . . . . . 6 - 31
OD10 . . . . . 8 - 2
OD2 . . . . . 8 - 2
OD4 . . . . . 8 - 2

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368

OD6 . . . . . .8 - 2
OD8 . . . . . .8 - 2
ODC15 . . . . . 6 - 17
ODC24 . . . . . 6 - 17
ODC5 . . . . . 6 - 17
ODC5A . . . . . 6 - 17
ODC5AQ . . . . . 6 - 39
ODC5P . . . . . 6 - 53
ODC5Q . . . . . 6 - 39
ODC5R . . . . . 6 - 21
OPTOWARE . . . . . 8 - 10
OUTPUT SWITCH . . . . . 6 - 25
PB16A . . . . . 4 - 20
PB16AH . . . . . .5 - 9
PB16C . . . . . 4 - 22
PB16H . . . . . 4 - 24
PB16HC . . . . . 4 - 28
PB16HE . . . . . 4 - 32
PB16HQ . . . . . 4 - 36
PB16J . . . . . 4 - 40
PB16K . . . . . 4 - 40
PB16L . . . . . 4 - 45
PB16T . . . . . 4 - 50
PB24 . . . . . 4 - 52
PB24HQ . . . . . 4 - 54
PB24Q . . . . . 4 - 56
PB32DEC . . . . . 4 - 58
PB32HQ . . . . . 4 - 60
PB4 . . . . . .4 - 2
PB4AH . . . . . .5 - 1
PB4H . . . . . .4 - 4
PB4MOA . . . . . .8 - 7
PB4R . . . . . .4 - 8
PB8 . . . . . 4 - 10
PB8AH . . . . . .5 - 5
PB8H . . . . . 4 - 12
PB8HE . . . . . 4 - 16
PBSA . . . . . .8 - 3
PBSB . . . . . .8 - 3
PBSC . . . . . .8 - 3
STRAP2 . . . . . .8 - 6
STRAP2Q . . . . . .8 - 6
STRAP4Q . . . . . .8 - 6
STRAP8 . . . . . .8 - 6
TERM1 . . . . . 1 - 11
UCA2 . . . . . 2 - 20
UCA3 . . . . . 2 - 21

Notes:

Opto 22
15461 Springdale St., Huntington Beach, CA 92649-1368